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The U.S. Blueberry Industry

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Abstract

U.S. blueberry output from the six major blueberry-producing States in 1992-94 averaged nearly 192 million pounds per year, including Maine's wild blueberry output. The largest concentration of cultivated blueberry production is located in Michigan and New Jersey, with substantial production in North Carolina, Oregon, and Washington. Blueberry production in these States has risen nearly 70 percent since the early 1980s. Maine provided nearly half of the processed blueberries in 1992-94, while Michigan accounted for one-fourth. New Jersey and Michigan provided the most fresh blueberries. Per capita consumption of fresh blueberries increased about 40 percent since the early 1980s and frozen consumption more than doubled. U.S.-grown blueberries are typically marketed from May through September. Prices show a very pronounced seasonal pattern, with the lowest prices at mid-season.

Keywords: Blueberry, production, prices, trade, shipments, consumption.

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Summary

The United States produced 195.1 million pounds of blueberries in 1994, with a farm value of about \$108 million, including Maine's wild blueberry output. The largest concentration of cultivated blueberry production is in Michigan and New Jersey, with substantial production in North Carolina, Oregon, and Washington. Other States with blueberry industries include: Arkansas, Florida, Georgia, Indiana, Mississippi, and New York.

Between 1992 and 1994, U.S. blueberry output from the six major blueberry-producing States averaged nearly 192 million pounds per year. Maine provided 36 percent; Michigan, 30 percent; New Jersey, 15 percent; Oregon, 8 percent; North Carolina, 7 percent; and Washington, 4 percent. Blueberry production in these States has risen nearly 70 percent since the early 1980s. Wild blueberry output from Maine increased significantly, while substantial growth of cultivated output occurred in other States. Higher yields per acre, resulting from improved cultural practices and more intensive management, were largely responsible for the output gain. Increased harvested acreage and expansion into non-traditional blueberry production areas also contributed.

Fresh use accounted for about 30 percent of the U.S. blueberry crops between 1992 and 1994, while the rest was processed (frozen). New Jersey and Michigan provided the most fresh blueberries. About half of U.S. processed output came from Maine, while Michigan accounted for one-fourth.

U.S. consumption of blueberries totaled 0.74 pound per person in 1993, and was comprised of 0.47 pound processed and 0.27 pound fresh. Fresh consumption rose 42 percent, on average, from 1980-82 to 1991-93 while frozen consumption increased 167 percent. Increased domestic production was accompanied by a nearly flat price trend that encouraged consumption.

Prices usually follow a very pronounced seasonal pattern, with the lowest prices at mid-season. Blueberries for fresh-market consumption usually sell for a premium over berries for processing. Growers have higher harvesting costs for fresh-market berries than for those used for processing, and quality standards are higher for fresh-market berries.

The U.S. blueberry marketing season extends from May through September. Harvesting usually begins in mid-April in Florida, early May in North Carolina, early June in New Jersey, and early July in Michigan, Oregon, and Washington. The latest harvesting dates in the United States are found in Washington, Michigan, and Maine. In a given location, peak blueberry harvest generally runs from 3-5 weeks.

Blueberries are marketed by individual growers, cooperative associations, and independent dealers. Some vertically integrated operations grow, pack, and market their own crops. Growers also sell directly to consumers through farmers' markets, roadside stands, or by allowing customers to pick their own fruit in the fields.

Blueberries are perennials that fall into three categories: highbush (grown mainly in the Eastern and Northern States) rabbiteye (native to the South), and lowbush (grown primarily in Maine). Cultivated blueberries reach peak production 7 to 10 years after establishment and, although the bushes can live 50 years, a 20- to 30-year life is typical. Wild blueberries are produced on native stands, many more than 100 years old. Plants are not replaced or renovated. Rather, plant vigor is maintained through pruning.

Highbush blueberry cultivation is concentrated in southeastern North Carolina, New Jersey, and southwestern Michigan. Lesser acreages are located in Washington, Oregon, Massachusetts, New York, and Indiana. In recent years, southern highbush varieties (cultivars) have been developed that grow as far south as central Florida. Temperature is a primary factor determining highbush-growing areas.

Native to Georgia and northern Florida, rabbiteye blueberry cultivars grow vigorously during hot summers, producing crops as far north as Alabama, Mississippi, and coastal North Carolina. Rabbiteye blueberries tolerate a wider range of soil conditions and require fewer chilling hours than highbush blueberries.

Lowbush, or wild, blueberries are not identifiable as to variety and grow naturally as a transition vegetation between the open field and forest. However, Maine's wild blueberries are cultivated in the sense that efforts are made to control weeds, diseases, and insects. Fields are severely pruned every other year to maximize production. Management may include fertilization, irrigation, and the placement of honeybee hives to aid pollination.

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Introduction

Blueberries are members of the *Ericaceae* family, which includes rhododendron, azalea, cranberry, lingonberry, and huckleberry. Roots of Ericaceous plants are often inhabited by fungi that aid in water and nutrient uptake, enabling blueberries to survive in dry, nutrient-poor areas of bogs. Blueberries, cranberries, and lingonberries are classified in the *Vaccinium* genus, while huckleberries are not. As a result, blueberries are more closely related to cranberries and lingonberries than to huckleberries. True, cluster-fruited blueberries belong to the subgenus *Cyanococcus* [8].

Although indigenous to North America, blueberries are among the most recently cultivated fruit crops. Domestication began in the late 19th century when selections of wild blueberries were transplanted to gardens and fields in New Jersey and Michigan. Crossbreeding programs were begun in 1908 by Frederick Coville using wild native plants from New Hampshire and New Jersey. Several improved varieties were developed and released during the 1930s and subsequently introduced in North Carolina and Washington. Today's blueberry industry originated in New Jersey and Michigan when grower cooperatives were formed in the 1930s to establish marketing channels [8].

Blueberries are classified as: (1) highbush, the major type cultivated in North America, (2) rabbiteye, cultivated in the southeastern United States, and (3) lowbush, harvested from managed wild stands. Highbush blueberries are grown mainly in Michigan, New Jersey, and North Carolina, but occur in native stands in a wide area between southern Nova Scotia and eastern Texas. Rabbiteye are native to the southern United States, and lowbush grow in the northeastern United States and the eastern provinces of Canada. Highbush and rabbiteye are identifiable as to variety and are cultivated in rows. In contrast, lowbush are not identifiable as to variety and grow naturally as transition vegetation between the open field and forest [3].

Blueberry fruit has several desirable characteristics that contribute to its popularity with growers and consumers. The skin is strong enough to allow mechanical harvesting, which costs less than hand picking, and helps fresh-market berries withstand the rigors of marketing. Fruit seeds are small and edible so fresh blueberries require little preparation. Fresh blueberries are

¹Numbers in brackets refer to sources cited in the list of numbered references that follows the text of the paper.

low in calories and sodium and a good source of fiber [8]. The unique flavor and color of blueberries remains even after processing. Blueberries are used in jams, jellies, syrups, muffins, pies, yogurt, and juice drinks [4].

Blueberries are grown over a wide area of the United States, but USDA's National Agricultural Statistics Service (NASS) reports cultivated production in only 11 States: Michigan, New Jersey, North Carolina, Oregon, Washington, Alabama, Arkansas, Florida, Georgia, Indiana, and New York. The last six States began reporting in 1992. The North American Blueberry Council (NABC) collects data for three States that are not reported by USDA: Maine, Mississippi, and Texas, as well as several Canadian provinces: British Columbia, Ontario, Quebec, New Brunswick, Nova Scotia, Newfoundland, and Prince Edward Island.

The U.S. Census of Agriculture reported blueberry production in 37 States in 1992 and a survey conducted in 1992 by the Department of Horticulture and Forestry at the University of Arkansas reported blueberries in 35 States. However, in 15 States there were less than 100 acres reported. [7].

This report examines the supply, demand, and price situation for blueberries and discusses industry characteristics with emphasis on the six major blueberry-producing States: Maine, Michigan, New Jersey, North Carolina, Oregon, and Washington. Cultivation and management practices are addressed, as are harvesting methods and marketing channels.

Supply

Most of the world's blueberries are grown in North America (tables 1 and 2). The United States and Canada produced 315 million pounds in 1993, surpassing the record set the year before. In total, other countries produced less than 10 million pounds in each of the years between 1980 and 1993. The U.S. blueberry crop was 195.1 million pounds in 1994, with farm value of about \$108 million (tables 3 and 4). Six States that have reported blueberry production only since 1992 contributed 15.9 million pounds and \$14.3 million to the 1994 totals.

U.S. blueberry output from the six leading States averaged nearly 192 million pounds annually between 1992 and 1994. Of that total, Maine provided 36 percent, Michigan 29 percent, New Jersey 15 percent, Oregon 8 percent, North Carolina 7 percent, and Washington accounted for 4 percent (figure 1). Most blueberries were processed, with 25-30 percent used fresh (figure 2). New Jersey and Michigan supplied the most fresh-market blueberries, followed by North Carolina, Oregon, and Washington. Maine supplied the most processed berries, followed by Michigan, New Jersey, Oregon, Washington, and North Carolina.

According to the North American Blueberry Council, British Columbia produced about the same volume of cultivated blueberries on average between 1991 and 1993 as did Washington and Oregon. And wild blueberries from eastern Canada

(Quebec, New Brunswick, Nova Scotia, Newfoundland, and Prince Edward Island) were nearly equal to Maine's output.

Canada is the source of most blueberries imported to the United States, as well as a major export destination for U.S. berries. Imports of fresh-market blueberries averaged 27 percent of the U.S. fresh blueberry supply in 1991-93 (table 5). Fresh imports have been rising since the early 1980s, when they accounted for about 12 percent of supplies. However, the import share of U.S. supplies may be overstated, because some of the fresh blueberries imported from Canada are frozen by plants in Maine. Frozen imports were just 6 percent of 1991-93 supplies, down from 9 percent in the mid-1980s (table 6).

Production Trends

North American blueberry production has tripled in the last 30 years. And just since 1980, production has more than doubled in Canada and the United States. The largest increase has been in wild blueberry output in Maine, but substantial growth in cultivated blueberry production has also occurred in other States. Some of the increase may be due to more complete reporting, but most sources credit more intense management, improved cultural practices, and increased planting of improved cultivars [Holbein, Yarborough].²

The following discussion of trends in production, acreage, yields, and prices is based on the six major, and traditional, blueberry-growing States (Maine, Michigan, New Jersey, North Carolina, Oregon, and Washington) that accounted for about 90 percent of 1994 production reported by NASS. Historical data are not available for many States where blueberry production has more recently become important. Although the six major States had wide year-to-year fluctuations in blueberry output, the trend has been upward, increasing from an average 114 million pounds in 1980-82 to 191 million pounds in 1992-94.

The rise in blueberry output was due to increased harvested acreage and higher yields per acre in some States (tables 7 and 8). Although data are incomplete for several States, the U.S. average blueberry yield was more than 10 percent higher in 1992-94 than in 1980-82. Higher yields were attained using newly developed varieties and improved management techniques, including increased irrigation, fertilization, and weed control. Average yields per harvested acre more than doubled in North Carolina since the early 1980s while Oregon's rose by one-third. Data were not complete for Maine, but 1992-94 yields appear to be much higher than in the early 1980s. Harvested acreage in the 6 major blueberry-producing States rose about 60 percent between 1980 and 1994. Maine, Michigan, Washington, and Oregon showed gains, while the area in New Jersey and North Carolina stayed about the same.

Output Fluctuations

Changes in yields per harvested acre account for more of the variability in blueberry output than changes in harvested acreage. For example, since 1980,

²Names in brackets refer to personal communications with persons listed after the references.

New Jersey's average annual yields ranged from 2,860 to 4,550 pounds per acre and North Carolina's from 530 to 5,170 pounds per acre. Major determinants of yield are the number of times an area is picked and the harvest method. In most States, except Maine, blueberries are picked several (3 to 5) times in a single season. Hand picking provides higher yields than mechanical harvesting, which can shake berries onto the ground and harvest unripe fruit.

Frost damage in the spring is a major cause of production shortfalls and, in the northernmost States, damage from extremely cold winters is possible. Spring frost damage severely reduced Michigan and New Jersey blueberry output in 1992. Bird depredation is a major peril in the Pacific Northwest and in Florida, where netting is sometimes used to protect blueberry bushes.

Irrigation can forestall yield loss due to excessive heat and inadequate rainfall and overhead sprinkler systems can be used to prevent frost damage. Blueberries are shallow-rooted plants and need 1-2 inches of rainfall per week during the growing season [2]. The extent of irrigation varies widely among States. According to the 1992 Census of Agriculture, almost none of Maine's blueberry acreage was irrigated, while about one-third of North Carolina's, two-thirds of New Jersey's, Michigan's, and Washington's, and nearly all of Oregon's was irrigated (table 9). Maine likely had approximately 200 acres of cultivated blueberries in 1992, rather than the nearly 900 reported in the census. Respondents misidentified managed wild stands as cultivated [Yarborough].

Demand

Fresh and Processed Use

Fresh use accounted for about one-third of U.S. blueberry consumption in 1992-94, and the rest was processed (frozen). In nearly all States, early maturing blueberries are likely to be hand picked for the fresh market, while later berries are likely to be mechanically harvested and used for processing. The number of times a field is hand harvested is influenced by the existing margin between fresh and processed prices. The margin must be large enough to justify the more costly hand harvest. However, cash flow is also a consideration; growers are usually paid for fresh sales within 2 weeks while full payment from processors may not be received for 2 years.

Most North Carolina and New Jersey blueberries (75 and 67 percent) were used fresh in 1992-94, while 40 percent of Oregon's end less than 30 percent of Washington's and Michigan's were fresh marketed. Maine's blueberries are harvested once and nearly all are processed. Fresh berries, typically sold in 1-pint containers, are marketed from roadside stands, in farmers' markets, or through supermarkets. Substantial "U-pick" or pick-your-own markets also exist in many States and are usually more important in States with small acreage (table 10).

More than 70 percent of the 1992-94 U.S. blueberry crops were processed rather than marketed fresh (figure 3). Freezing allows blueberries to be used later

in canned fruit fillings, bakery products, muffin mixes, yogurt bases, preserves, juice concentrates, and salsas. In addition, individually quick frozen (IQF) blueberries are a retail product. The largest quantity of processed (frozen) blueberries is used by food service establishments and bakeries [4].

Exports and Consumption

Most blueberries grown in the United States are used to meet domestic demand. Less than 15 percent of the 1992-94 blueberry supply was exported. About 90 percent of U.S. fresh exports went to Canada, with the rest going to Germany, Italy, Switzerland, the United Kingdom, the Netherlands, Belgium, and Denmark. More than 40 percent of U.S. frozen blueberry exports were to Germany, while Canada accounted for about 30 percent. Japan, the Netherlands, Belgium, Australia, the United Kingdom, Italy, and France each received 5 percent or less of U.S. frozen blueberry exports [4].

The United States usually exports more frozen blueberries than it imports. However, frozen exports amounted to less than 10 percent of total frozen supplies in 1992-94, compared with about 20 percent in the early 1980s. Fresh blueberry exports have also declined relative to supplies, from about 25 percent in the early 1980s to about 20 percent of supplies in 1992-94. The level of U.S. exports has not declined, but rather, domestic production has risen.

U.S. consumption of blueberries totaled 0.74 pound per person in 1993, and was comprised of 0.47 pound processed and 0.27 pound fresh. Fresh consumption rose 42 percent from 0.17 pound in 1980-82 to an average 0.24 pound in 1991-93. Frozen consumption increased at a higher rate, by 167 percent, from 0.15 pound to 0.40 pound per person. Production gains were accompanied by a nearly flat price trend that encouraged consumption (figure 4).

Prices

The fresh blueberry marketing season in the United States is relatively short, about 5 months from May through September (table 11). Shipments in other months are imports. Fresh blueberry prices generally are at their peak at the beginning of the season (table 12).

The earliest shipments, from Florida in April and May, have been reported only since 1990. Prices usually drop sharply in late May when more berries from North Carolina become available, and trend downward through June, when New Jersey starts shipping blueberries (table 13). Prices are lowest in July with New Jersey and Michigan shipping. August prices are variable, and may begin to rise if New Jersey's harvest ends before Michigan volume picks up. Prices rise in September as shipments from Michigan decline (figures 5 and 6).

Blueberries for fresh-market use usually sell at a premium over berries for processing (table 14). Production costs are higher for fresh-market berries than for processing berries because of the added costs for hand-harvesting and packing. In addition, prices are typically highest early in the season.

Thus, North Carolina, which begins marketing earlier than New Jersey, has a higher average fresh-market blueberry price (figures 7 and 8). However, prices for New Jersey processing blueberries are typically higher than North Carolina's.

Average prices for fresh and processing blueberries in New Jersey generally move in the same direction--up in years when production declines and down when it rises (figures 9 and 10). North Carolina blueberries are intended for the fresh market and processing is a residual use. Prices for processing blueberries in different States tend to be more similar than fresh prices in different States. This is in part because markets for fresh blueberries are more likely to be isolated geographically.

However, processing prices are generally higher in Washington, for example, than in Maine (table 14). Washington blueberries are more likely to be handpicked and individually quick frozen. Maine blueberries are hand raked and may have up to 25 percent shrinkage from water loss in transit, as well as weeds, leaves, and other foreign material [Holbein]. Processing prices are also determined by the volume of berries available in the market and consumer demand. Carryover stocks of frozen blueberries dampen price changes (tables 15 and 16; figures 11 and 12).

Industry Characteristics

Most blueberry-producing farms are small and more likely to produce other berries than any other crops. Wild blueberry farms generally are not diversified and produce only blueberries [Yarborough]. A special tabulation of farms reporting blueberry production in the 1987 Census of Agriculture indicated that 77 percent of the U.S. farms that reported blueberry sales had annual crop sales of \$25,000 or less (table 17). A higher proportion of large farms were in New Jersey, where 4 percent of the blueberry farms reported sales of \$500,000 or more. From 64 to 68 percent of blueberry farms in New Jersey, Michigan, and North Carolina were in the smallest sales class, while 75-83 percent of the farms producing blueberries in Maine, Oregon, and Washington were in the smallest sales class.

Off-farm employment was an important source of income for most blueberry growers. Less than half of the growers reported farming as their principal occupation and 48 percent worked 100 or more days per year off farm. Most blueberry farms sold other berries, fruit, or nuts, but very few had vegetables or other crops. Nearly three-fourths of 1987 crop sales were from berries, fruit, or nuts. On the smallest farms, livestock provided more than half of the agricultural sales.

According to the 1992 Census of Agriculture, there were 5,908 blueberry-growing operations in the United States, an increase of about 1,500 farms from the 1987 Census. Georgia, Florida, Alabama, Maine, and North Carolina accounted for most of the gain.

Cultivation and Management Practices

Blueberries are perennials that fall into three categories: highbush (grown mainly in the Eastern and Northern States); rabbiteye (native to the South), and lowbush (grown primarily in Maine). Within the first two major types of blueberry, numerous cultivars have been developed that have high yields and other desirable characteristics, such as cold hardiness, high sugar content, and good post-harvest shelf life. Growers frequently have several different cultivars to aid in cross pollination. The use of multiple cultivars also helps protect from frost damage (due to slightly varied bloom times), and helps spread out harvest. About 80 percent of North American blueberry acreage in 1992 was made up of highbush types, with "Bluecrop" and "Jersey" being the dominant cultivars (table 18).

Highbush Blueberries [2,3,8,9]

Highbush blueberry cultivation is concentrated in southeastern North Carolina, New Jersey, and southwestern Michigan. Lesser acreages are located in Washington, Oregon, Massachusetts, New York, and Indiana. In recent years, southern highbush varieties (cultivars) have been developed that grow as far south as central Florida. Temperature is a primary factor determining highbush-growing areas. Most northern highbush varieties need at least 900 to 1,000 hours of temperatures below 45°F. Southern highbush varieties in Florida and along the Gulf coast, however, may have chilling requirements as low as 200 to 300 hours below 45°F. Minimum winter temperatures determine the northern limit of the highbush range. Temperatures below -15°F to -20°F damage flower buds and reduce yields. As a result, the northern boundary of highbush production is southern Maine and central Michigan.

Highbush blueberry plants require a growing season of at least 160 days. Preferable soils are well-drained, sandy loams with a pH of 4.5 to 5.2 (acidic). Blueberries are shallow-rooted and require adequate soil aeration and good drainage. In heavy or poorly drained soils, installation of canals, ditches, or tiling may be required, or the rows may be planted on raised beds. Growers usually plant 2- or 3-year old nursery stock. Spring planting is advised to reduce losses to young plants due to heaving during the winter. A complete chemical fertilizer is applied annually to highbush blueberries. Irrigation is useful for meeting the water requirement of 1-2 inches per week and helps prevent problems resulting from fertilizer concentration. In the absence of irrigation, mulching can help conserve soil moisture, suppress weeds, maintain more uniform soil moisture, and prevent heaving. Sawdust, bark, wood chips, and pine needles are typical mulches, used at a thickness of 4 to 6 inches. Herbicides are also commonly used for weed control.

Although highbush blueberry plants are self-pollinating, larger and higher-quality fruit set are obtained with cross-pollination. Rows of one cultivar are sometimes alternated with rows of another cultivar that blooms at about the same time. However, different ripening times among cultivars may hamper efficient harvesting. Bees aid pollination and, when wild bees are insufficient in number, growers introduce honeybee hives, generally at the rate of one or two per acre.

Highbush blueberries can range in height from 5 to 23 feet. Mature, cultivated highbush are typically less than 10 feet tall. Mature highbush plants must be pruned each year to obtain the best-quality fruit, promote new shoot development, and enhance plant vigor. Generally, canes that are more than 4 years old are removed, and weak shoots on young canes are cut back to a strong lateral. Pruning is normally performed by hand after harvest, when the bushes are dormant.

During the first two growing seasons, pruning blueberry bushes involves removing all flower buds to promote vegetative growth. A small crop is usually harvested during the third growing season. Plants generally reach maturity and maximum bearing potential between the seventh and tenth growing seasons. Blueberry bushes can live for 50 years, but a 20-30 year life span is typical.

Southern highbush cultivars have been developed in recent years by hybridization of highbush and rabbiteye cultivars and other species native to the South. These cultivars require fewer chilling hours than the northern highbush. Although bloom is at about the same time as rabbiteye, southern highbush berries ripen earlier, providing berries in late April and early May, before berries are available from other established production areas.

Rabbiteye Blueberries [2,3,6]

Rabbiteye blueberry cultivars are distinguished by their tolerance of a wide range of soil pH levels and temperatures, their inherent drought resistance, and their low chilling time. Native to Georgia and northern Florida, the rabbiteye blueberry grows vigorously during hot summers and produces crops as far north as Alabama, Mississippi, and coastal North Carolina. Rabbiteye blueberry cultivars require only one-third to one-half as many chilling hours as highbush blueberry cultivars.

Rabbiteye blueberries can be planted at any time during the dormant season and grow well on various soils, but prefer light, well-drained soils. They have a fibrous root system that penetrates more deeply than does the highbush root system, although it is still relatively shallow. Soil drainage is important, and the use of drainage ditches or raised beds may be necessary in poorly drained areas. Since most soils used for blueberries in the South are low in organic matter, peat moss is frequently added to improve soil structure and increase water-holding capacity. Rabbiteye cultivars appear to respond less to fertilization than do highbush cultivars.

Although rabbiteye are generally more drought tolerant than highbush, many areas in the South require irrigation to maximize yields. Since rabbiteye plants can produce a large crop and a large number of new shoots at the same time, little annual pruning is required, except to keep bushes from becoming too dense and tall. Rabbiteyes can reach heights of 33 feet, but are pruned to manageable heights in commercial plantings. As with highbush varieties, flower buds are removed for the first 2 years to prevent fruiting and promote vegetative growth while rabbiteye blueberry bushes become established.

Lowbush Blueberries [12]

Lowbush, or wild, blueberries are not identifiable as to variety and grow up naturally as a transition vegetation between open field and forest. Wild blueberries are produced on native stands, of which many are more than 100 years old. Plants are not replaced or renovated. Rather, plant vigor is maintained through pruning. In addition, Maine's wild blueberries are "cultivated" to the extent that stands are managed to control weeds, diseases, and insect pests. Fields may be fertilized, treated with herbicides, and irrigated, in addition to being severely pruned in alternating years, to maximize production.

Historically, burning was the main pruning method for Maine's wild blueberry stands, but recently mowing has been widely used. Repeated burning was found to destroy the organic pad and allow exposure of the rhizomes. Mowing does not damage the organic pad, produces equivalent yields, and costs less than burning. However, burning more completely removes competing growth of other species and destroys leaf litter, where insects and diseases can thrive. Favorable weather can lead to outbreaks of such pests in mowed fields, necessitating periodic burning for control.

Bee hives are usually brought in by growers to aid pollination. Most lowbush blueberries are self-sterile so that one genotype must be pollinated by another. This is not a management problem, however, because wild blueberry harvesting is from native stands consisting of numerous lowbush species. As with highbush, cross pollination increases seed number and berry size.

Although irrigation has been found to increase lowbush blueberry yields, it is used by relatively few growers. Lowbush plants do not consistently respond to fertilization. Leaf analysis can be used to indicate which, if any, nutrients are deficit. Generally, weed control is more beneficial than fertilization. By removing weed competition, lowbush blueberries are typically able to receive adequate levels of nutrients.

Harvesting³

The harvest season for cultivated U.S. blueberries depends on the variety and the climate of a particular production area. The harvest usually begins in mid-April in Florida, early May in North Carolina, early June in New Jersey, and early July in Michigan, Oregon, and Washington. Maine's harvest begins in August. Harvest usually ends last in Washington and Michigan (table 191).

In a given location, peak blueberry harvest generally runs from 3-5 weeks. Berries must be picked several times (that is, in several intervals) during the harvest period. The interval between pickings usually ranges from 5 to 10 days. Weather conditions during the harvest period affect the timing of

³ Much of the information in this and the remaining sections of the report came from the personal contacts listed in the reference section.

pickings and greatly affect berry quality. If temperatures are high, berries are not likely to be of acceptable quality after 7 days. As harvest progresses, the picking interval shortens.

Berries that are hand picked are intended for the fresh market, while those that are mechanically harvested are primarily for processing. However, some mechanical harvesting is also used for fresh-market berries. The first pickings of the season generally result in high-quality berries that are most likely to be destined for the fresh market, while the last pickings are more likely to be processed. Even lower quality berries--those that are over-ripe or damaged--can be processed into juices; and used as flavoring in yogurt and other products.

Mechanical Harvesting [8]

Machine harvesting generally provides lower-quality berries than hand picking. Machines harvest over-ripe, shriveled, soft, diseased, insect- and bird-damaged, and green berries along with the good berries. Most of the inferior berries would be discarded by a good hand picker. Bruising is also more of a problem with machine harvesting. Further, debris is collected with the berries that must later be separated. Mechanically harvested berries need careful grading.

Yields are also generally lower for machine-harvested berries than for those that are hand-picked. After a machine has passed, the recoil of the stems results in a loss of both ripe and green berries on the ground. Berries can also be lost between the harvester catch plates. Mechanical harvesters can also cause branch breakage or scarring that can become an entry point for diseases. Generally, larger acreages are more likely to be machine harvested than smaller acreages.

Mechanical harvester technology has improved in the last 10 years and there are several types available. One harvester uses a hand-held, electric-powered vibrator and a catching frame. The earliest type of self-propelled, over-the-row harvester had a mechanism made of metal rods that slapped the bushes from both sides to dislodge the berries. However, 15-25 percent of the berries can be lost with this method of harvest. A sway-type picking mechanism loses fewer berries, but the rods that compress and sway the bush from side to side to dislodge the berries may damage the bush.

The most recent harvester technology uses a rotary head and imparts the least fruit bruising and stem damage. On either side of the picking tunnel, a revolving drum with multiple nylon wands turns with the forward motion of the machine. Despite some problems, the industry trend is toward increased mechanical harvesting due to expanded blueberry acreage and the lower cost associated with machine harvesting.

Hand Harvesting

Both migrant workers and local pickers are employed in hand picking. The average picker can harvest 5 or 6 12-pint flats in an 8-hour day. However,

highly skilled pickers can pick as many as 20 flats per day. Two to four pickers per acre are needed at the beginning and end of the season, while eight to ten per acre are needed at the harvest peak. Pickers are generally paid on the basis of the volume of berries picked. Picking directly into market containers has the advantage of minimizing handling and better preserving the surface bloom (natural waxy covering) of the berry. Berries can also be harvested into buckets for grading and packing at a packingshed.

In Maine, pickers generally use hand-held rakes to remove berries from the bush. The rake, which consists of a box with a set of tongs or fingers, is pulled through the blueberry bushes, removing the berries and depositing them in the box. The berries are then placed in a 5-gallon bucket for transport to a collection point in the field.

Prices and Costs [1,6,8,9,11,12]

High harvest costs and low profit margins may curtail blueberry harvest, if the crop is of relatively low quality, grower prices are low, and labor costs are high. Mechanical harvesting and sorting of blueberries for processing was recently estimated to cost about 25 cents per pound. In contrast, the cost for hand-harvesting and packing fruit for the fresh market amounted to about 50 cents per pound. Costs include packing supplies, labor, and marketing charges.

The value of the blueberry crop "on the bush" is much less than its value at the first delivery point. Hand-harvesting costs typically amount to 75 percent of total production costs for fresh-market blueberries. Although mechanical harvesting costs less than hand harvesting, machine harvesting can still account for 50 percent of the cost of producing processing berries. And if processing prices are very low, growers may decide not to harvest.

Marketing

Growers may deliver their berries to nearby receiving stations owned by dealers or cooperatives, or the dealer or cooperative may send a refrigerated truck to pick up berries in the field. When picked up by truck, berries usually lose their field heat more quickly and therefore retain higher quality than those delivered to receiving stations. If properly cooled to 33°F, fresh blueberries have a shelf-life of 14 days.

Blueberries intended for the fresh market are cooled, graded, packaged, and inspected to verify that Federal/State standards are met. Berries that do not make the grade for fresh use are diverted to processing. Quality is rarely so low that the berries are not accepted for some type of processing. The poorest berries are used for juice.

Blueberries destined for processing follow a different path than those intended for the fresh market. After picking, berries for processing pass over a blower, and then through a water separator, which is used to "float" green berries. The berries then are dried and either bulk frozen or individu-

ally quick frozen. After packaging, inspectors select cartons randomly and check that Federal and/or State grade standards are met.

State marketing orders frequently establish a grower assessment based on production to provide funds for research and promotion. Maine, New Jersey, Oregon, and Washington have blueberry marketing orders, but Michigan and North Carolina do not.

Blueberries are marketed by individual growers, cooperative associations, and independent dealers. Some vertically integrated operations grow, pack; and market their own crops. Cooperatives and independent dealers market berries to the fresh market or to processing plants. Growers can sell directly to consumers from farmers' markets or roadside stands, or they may allow customers to pick from their fields. The importance of fresh, processed, and U-pick markets in various States is shown in table 10.

Cooperatives have been extremely effective in some regions because they allow growers to pool their output to meet the needs of large buyers. Grower cooperatives often own refrigerated trucks, packing houses, and cooling sheds and provide low-cost inputs to producers. Cooperatives also make efficient use of promotion and advertising dollars collected from members. In the Southern States where most blueberry farms are small, more than half of the blueberry growers are members of cooperatives. There are several very large growers in New Jersey, and less than half of the State's crop is marketed by cooperatives. Northwest blueberry growers sell directly to processors (or to the public) and cooperative marketing is rare.

Two of the largest blueberry cooperative associations in the United States are the Michigan Blueberry Growers Association (MBG) and Tru-Blu Cooperative. MBG handles about half of the Michigan blueberry crop and also markets blueberries for growers in Indiana, Florida, Louisiana, Georgia, Mississippi, Arkansas, and North Carolina. Tru-Blu is based in New Lisbon, New Jersey and markets for New Jersey, North Carolina, and other States. Cooperative associations generally pool the output from a number of growers. The price a grower receives is based on the average returns received for the pool, less marketing expenses paid by the association. Growers can receive payments for fresh market berries each week, while payments for processing berries may extend up to a year after harvest.

State Analyses

Michigan

Blueberry production is located along the southeastern shore of Lake Michigan, primarily in five counties: Allegan, Berrien, Muskegon, Ottawa, and Van Buren. The Jersey and Bluecrop highbush varieties account for about 70 percent of the State's blueberry area. At least half of the crop is likely to be mechanically harvested. The first two pickings are usually by hand, while the third, fourth, and fifth pickings are generally by machine. About three-fourths of Michigan blueberries are usually processed.

The proportion of mechanical harvesting is affected by the size and maturity of the crop. If the crop is large and substantial amounts are not harvested before September, when the labor supply diminishes, growers must use mechanical harvesters or lose the blueberries remaining on the bushes [Holbein].

Michigan's blueberry harvest usually begins the second week of July, peaks between the last week of July and the third week of September, and finishes early in October. There is no State marketing order for grades, standards, promotion, or research.

North Carolina

About 85 percent of North Carolina's blueberries are grown within a 10-square-mile area, in the southeast part of the State, mainly in Bladen, Columbus, and Pender Counties. Hand picking is dominant because more than 70 percent of North Carolina's blueberries are used fresh. About half of the crop is delivered to a receiving station and the remainder is picked up from the field, by the association or dealer, using refrigerated trucks. Marketing channels in North Carolina include three cooperative associations (including MBG and Tru-Blu) and several independent dealers. More than half of North Carolina's blueberries are usually marketed through the cooperatives.

About 60 percent of North Carolina's blueberry acreage is Croatan, a highbush variety that is resistant to canker. Harvest begins the second week of May, is most active during June, and ends the second week of July.

New Jersey

The primary blueberry-growing counties in New Jersey have quite different characteristics. In Atlantic County, there are a few, large growers (with more than 100 acres of blueberries). Most growers in the county raise only blueberries, although some also raise cranberries. Nearly all Atlantic County blueberries are irrigated. Some of the largest growers are also packers-shippers and market their own brand of berries.

In contrast, Burlington County has about 80 small growers, with about 10-20 acres per grower. They generally market their crop through the Tru-Blu Cooperative Association. There is very little irrigation in Burlington county. Yields per acre and total output are much lower than in Atlantic county. In general, Burlington County growers are more diversified than is common in Atlantic County, with many having cranberries.

Highbush varieties are dominant in New Jersey: Bluecrop accounts for 50 percent and Weymouth accounts for about 30 percent of planted acres. Typically, New Jersey growers harvest twice by hand-picking within a season and sell those berries for the fresh market. The last one or two pickings are done with a mechanical harvester. About 75 to 80 percent of the crop is hand harvested and nearly 70 percent used fresh. Harvest begins the second week of June, peaks between the first of July and mid-August, and is finished by the end of August.

Maine

Blueberries are grown in the coastal area of Maine, primarily in Hancock, Knox, Washington, and Waldo Counties. Harvest usually starts at the beginning of August, peaks during the third week of August, and ends early in September. Nearly all of the Maine blueberry crop is processed. There are about 10 processing plants in the State. Two processing plants have canning as well as freezing facilities. The largest processors also provide management services to growers, such as spraying and burning. Processors may contract to buy all that a grower can deliver at a pre-established price, or may regulate deliveries by the number of field boxes supplied to the grower.

Several large growers account for about half of Maine's blueberry acreage and own processing plants. There are about 300 small growers and 3 grower cooperatives, including the Wild Blueberry Association, which promotes sales of individually-quick-frozen (IQF) blueberries.

Berries for processing go from the field to a receiving station, where they are winnowed and placed in 25-pound field boxes. They are then taken to a processing plant, where they are again winnowed, washed, and graded. Grades are established by a State marketing order that also funds blueberry promotion through grower assessments. Berries that are rejected by the factory do not have an alternative use. After inspection, berries are frozen and placed in 40-pound boxes for storage.

Growers are paid on the basis of the weight or volume recorded at the receiving station. Grading at the plant is to improve the quality of the pack, but does not affect individual growers' prices. Too many green or over-ripe berries will lower the quality of the pack and can reduce the pool price. It is the overall quality of the processor pack that determines the price received by each grower.

Oregon and Washington

Northwest blueberry production is centered in Clackamas, Marion, Washington, and Yamhill Counties in Oregon, and Clark and Whatcom Counties in Washington. Strawberries, blackberries, and raspberries are grown commercially in some of the same areas. The Northwest blueberry harvest usually begins the first week of July, is most active in August, and is completed by early October.

Major varieties grown in Oregon are Bluecrop (30 percent of blueberry acreage in the State) and Berkeley (25 percent) and, in Washington, Bluecrop (25 percent) and Jersey (15 percent). Although USDA data indicate that a majority of the crop is processed, about half of the crop is reportedly hand harvested. The bushes may be picked five times in a season. Most fresh blueberries are sold directly to consumers from roadside stands and pick-your-own operations.

There are no formal marketing organizations in Oregon and Washington. State marketing orders authorize the collection of assessments to be used for research and promotion. Small growers often sell their crops to large growers that are vertically integrated, with grading and packing lines, coolers, and

freezing or canning equipment. These large growers are likely to produce many types of berries and grow, pack, and market their own berries.

Processing contracts may be used to ensure an outlet for growers, and a supply for processors. The price, however, is not likely to be predetermined under such transactions, and generally fluctuates with market conditions at the time of delivery. There is no price pooling, and growers mainly receive the current market price for their blueberries, whether selling to processors or for the fresh market.

Conclusions

This description of the U.S. blueberry industry was intended to be quite general in nature. Local conditions and marketing practices may vary. Most of the anecdotal information was gathered in early 1994. Numbers of growers, handlers, and cooperatives have likely changed. However, the long-term trends of increasing production, expanding market demand, and flat prices have been well documented. The substantial growth of the blueberry industry evident since 1980 may not continue through the 1990s, if new uses for blueberries are not found and consumer demand flattens. But a more likely scenario is continued steady growth of the U.S. blueberry industry due to innovative promotion, advances in technology, and expanding trade.

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Table 1--Blueberry production, selected countries, 1980-93

Year	United States	Canada	New Zealand	France	Sweden	Italy	The Netherlands	Morocco	Total
1,000 pounds									
1980	102,253	30,087	40	2,205	1,102	1,153	NA	NA	136,839
1981	116,998	39,756	73	2,205	2,205	2,370	NA	NA	163,606
1982	121,696	51,225	110	2,205	2,205	3,197	NA	NA	180,637
1983	134,351	49,703	220	2,205	2,205	3,181	NA	NA	191,865
1984	120,060	37,602	331	2,205	2,205	1,199	NA	NA	163,601
1985	146,330	47,738	772	2,205	2,205	1,005	NA	NA	200,254
1986	151,586	36,663	1,213	2,205	2,205	1,382	NA	NA	195,253
1987	147,088	74,308	1,543	2,205	2,205	2,650	NA	22	230,021
1988	152,846	70,276	1,874	2,205	2,205	1,138	661	44	231,248
1989	154,420	57,918	2,075	2,205	2,205	1,543	661	66	221,093
1990	179,139	79,660	2,712	2,205	2,205	1,543	661	88	268,213
1991	154,230	79,065	2,646	2,205	2,205	1,881	661	110	243,002
1992	195,043	83,628	2,646	2,205	2,205	1,984	661	110	288,482
1993	231,684	83,500	2,646	2,205	2,205	1,984	661	110	324,995

NA: Not available.

Sources: National Agricultural Statistics Service, USDA (United States).
North American Blueberry Council (Canada)
Food and Agriculture Organization, United Nations (other).

Table 2--Blueberry production in Canada, 1985-93

Item/Province	1985	1986	1987	1988	1989	1990	1991	1992	1993
1,000 pounds									
Production:									
Newfoundland	320	1,664	5,712	2,500	2,500	2,768	4,088	900	310
Prince Edward Island	750	500	912	1,414	972	2,000	1,612	1,700	2,500
Nova Scotia	19,322	16,510	22,300	22,648	17,014	28,160	28,098	33,170	30,940
New Brunswick	5,202	6,000	7,100	9,150	6,250	9,400	8,500	9,292	7,200
Quebec	9,000	1,014	19,798	17,000	14,062	17,108	22,500	7,500	23,250
Ontario		1,618	1,612	1,092	1,120	1,232	1,116	1,066	1,000
British Columbia	13,144	9,358	16,874	16,472	16,000	18,992	13,150	30,000	18,300
Total	47,738	36,664	74,308	70,276	57,918	79,660	79,064	83,628	83,500
Processed use:									
Newfoundland	NA	NA	5,700	2,500	2,500	2,000	3,500	900	300
Prince Edward Island	NA	NA	900	1,400	900	2,000	1,600	1,700	2,500
Nova Scotia	NA	NA	22,300	22,400	16,700	26,700	27,600	32,700	30,900
New Brunswick	NA	NA	6,900	8,900	6,000	8,700	8,200	9,200	7,200
Quebec	NA	NA	18,200	16,000	13,000	17,000	21,000	6,700	21,300
Ontario	NA								
British Columbia	NA	NA	13,500	13,000	12,000	12,000	9,600	23,000	13,300
Total	NA	NA	67,500	64,200	51,100	68,400	71,500	74,200	75,500

NA: Not available.

Source: North American Blueberry Council.

Table 3--Blueberry production and utilization, selected States, 1980-94

Item/State	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
1,000 pounds															
Total utilized production:															
Maine ¹	21,190	21,747	35,925	44,653	24,684	43,730	40,169	36,300	52,344	26,800	72,400	39,300	84,200	64,600	59,500
Michigan ²	41,000	52,000	41,400	49,148	46,666	50,200	57,000	56,100	43,384	60,100	56,500	54,800	34,000	87,000	47,000
New Jersey	25,993	28,000	30,000	23,000	30,000	40,000	40,000	28,000	26,000	40,000	23,500	31,000	23,000	31,500	31,500
North Carolina	5,970	7,150	4,750	5,100	9,410	1,700	5,460	11,460	14,000	10,000	6,100	11,500	10,600	15,000	15,000
Oregon	3,000	3,500	3,500	5,250	4,500	5,200	6,057	9,228	10,218	11,220	11,455	12,516	15,500	14,500	17,500
Washington	5,100	4,600	6,120	7,200	4,800	5,500	2,900	6,000	6,900	6,300	6,290	4,950	8,160	6,720	8,680
Alabama	NA	360	48	325											
Arkansas	NA	1,800	2,000	1,700											
Florida	NA	2,100	1,000	3,000											
Georgia	NA	12,000	5,500	7,500											
Indiana	NA	2,500	2,800	2,700											
New York	NA	1,300	1,680	700											
Total	102,253	116,997	121,695	134,351	120,060	146,330	151,586	147,088	152,846	154,420	176,245	154,066	195,520	232,348	195,105
Fresh use:															
Maine ¹	NA	300	300	1,000	1,000										
Michigan ²	14,500	14,000	14,200	13,425	20,484	19,100	16,800	15,500	11,500	18,300	21,500	15,000	10,000	19,000	15,000
New Jersey	19,998	20,700	22,000	18,000	24,140	31,000	28,000	22,000	18,000	23,000	19,000	21,500	13,000	24,000	21,000
North Carolina	5,520	5,880	3,610	4,230	8,460	1,678	4,860	7,370	9,300	8,000	5,700	8,100	7,600	11,000	12,000
Oregon ³	1,400	1,900	2,000	2,450	2,300	2,900	3,057	5,141	5,304	5,485	4,230	4,622	4,500	6,500	8,000
Washington	1,765	2,036	1,620	2,250	1,700	2,100	1,100	2,400	1,800	2,100	1,300	1,250	1,960	2,020	2,680
Alabama	NA	360	48	325											
Arkansas	NA	1,800	2,000	1,700											
Florida	NA	2,100	1,000	3,000											
Georgia	NA	3,000	1,500	2,000											
Indiana	NA	1,000	1,400	1,700											
New York	NA	670	850	700											
Total	43,183	44,516	43,430	40,355	57,084	56,778	53,817	52,411	45,904	56,885	51,730	50,772	45,802	70,545	68,240
Processed:															
Maine ¹	21,190	21,747	35,925	44,653	24,684	43,730	39,669	35,300	51,800	26,500	72,000	39,000	83,900	63,600	58,500
Michigan ²	26,500	38,000	27,200	35,723	26,182	31,100	40,200	40,600	31,900	41,800	35,000	39,800	24,000	68,000	32,000
New Jersey	6,000	7,300	8,000	5,000	4,860	9,000	12,000	6,000	8,000	17,000	4,500	9,500	10,000	7,500	10,500
North Carolina	450	1,270	1,140	870	950	22	600	4,090	4,700	2,000	400	3,400	3,000	4,000	3,000
Oregon ³	1,600	1,600	1,500	2,800	2,200	2,300	3,000	4,087	4,914	5,735	7,225	7,894	11,000	8,000	9,500
Washington	3,335	2,564	4,500	4,950	3,100	3,400	1,800	3,900	4,700	4,200	4,990	3,700	6,200	4,700	6,000
Alabama	NA	68	3	65											
Arkansas	NA	200	100	100											
Florida	NA	850	500	700											
Georgia	NA	9,000	4,000	5,500											
Indiana	NA	1,500	1,400	1,000											
New York	NA														
Total	59,075	72,481	78,265	93,996	61,976	89,552	97,269	93,977	106,014	97,235	124,115	103,294	149,718	161,803	126,865

NA= Not available.

¹Maine produces wild blueberries, other States cultivated. ² Includes small amount from Indiana, prior to 1992. ³Fresh and processed use was estimated by ERS for years not reported, 1986-91.

Sources: New England Agricultural Statistics Service, Oregon Agricultural Statistics Service, Washington Agricultural Statistics Service, and National Agricultural Statistics Service, USDA.

Table 4--Average farm-gate value of blueberry production, selected States, 1980-94

State	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Thousand dollars															
Maine	8,056	9,156	18,681	16,539	6,170	10,058	12,452	16,335	23,555	13,400	28,500	17,685	36,206	19,380	17,850
Michigan ¹	16,408	26,568	33,217	30,735	19,823	24,878	34,301	35,083	43,512	36,875	29,789	43,004	27,100	34,650	25,180
New Jersey	15,870	18,201	21,360	18,260	17,980	25,688	23,216	22,920	26,360	29,936	19,440	24,235	21,820	25,005	23,205
North Carolina	4,885	5,444	4,061	4,320	8,320	2,105	5,198	9,199	12,347	7,997	6,655	9,431	9,545	13,354	13,878
Oregon	1,410	2,166	2,385	3,549	2,311	2,876	4,040	5,550	7,707	7,708	6,942	8,115	12,010	7,953	9,070
Washington	2,788	2,782	4,283	4,637	2,390	3,462	2,022	4,312	4,932	4,326	3,720	3,370	5,771	3,409	4,182
Subtotal	49,417	64,317	83,987	78,040	56,994	69,067	81,229	93,399	118,413	100,242	95,046	105,840	112,452	103,751	93,365
Alabama	NA	308	47	247											
Arkansas	NA	1,812	1,928	1,652											
Florida	NA	3,752	1,300	5,690											
Georgia	NA	9,090	2,610	4,125											
Indiana	NA	1,745	1,352	1,847											
New York	NA	1,144	1,646	756											
Subtotal	NA	17,851	8,883	14,317											
Total	49,417	64,317	83,987	78,040	56,994	69,067	81,229	93,399	118,413	100,242	95,046	105,840	130,303	112,634	107,682

NA= Not available.

¹1982-91 estimated by the Economic Research Service, USDA.

Sources: New England Agricultural Statistics Service, Oregon Agricultural Statistics Service, Washington Agricultural Statistics Service, and National Agricultural Statistics Service, USDA.

Table 5--Fresh blueberries: Supply and utilization, 1980-94

Year	Utilized production 1/	Imports 2/	Total Supply	Exports 2/	Consumption	
	----- Million pounds -----				Pounds	
1980	43.183	4.418	47.601	7.690	39.9	0.18
1981	44.156	4.570	40.726	11.541	37.2	0.16
1982	43.430	9.240	52.678	16.107	36.6	0.16
1983	40.355	8.397	48.752	16.908	31.8	0.14
1984	57.084	8.949	66.033	10.129	55.9	0.24
1985	56.778	11.871	68.649	9.096	59.6	0.25
1986	53.817	10.579	64.396	18.297	46.1	0.19
1987	52.411	16.905	69.316	22.928	46.4	0.19
1988	45.904	25.661	71.565	10.437	61.1	0.25
1989	56.885	13.781	70.666	10.698	60.0	0.24
1990	51.311	16.845	68.156	12.239	55.9	0.22
1991	50.314	20.839	71.153	10.361	60.8	0.24
1992	45.042	20.409	65.451	14.412	51.0	0.20
1993	69.695	17.867	87.562	18.477	69.1	0.27
1994	68.240	19.000	87.240	17.800	69.4	0.27

1/ Fresh utilization from the National Agricultural Statistics Service, USDA.

2/ Trade data from the Bureau of the Census, U.S. Department of Commerce.

Source: Economic Research Service, USDA.

Table 6--Frozen blueberries: U.S. supply and utilization, 1980-94

Year	Commercial pack 1/	Beginning stocks 2/	Imports 3/	Total supply	Exports 3/	Ending stocks 2/	Consumption	
	----- Million pounds -----						Pounds	
1980	36.4	36.4	6.803	79.6	12.414	29.4	37.8	0.17
1981	50.1	29.4	5.664	85.2	20.277	25.4	39.5	0.17
1982	46.5	25.4	4.402	76.3	20.110	28.5	27.7	0.12
1983	43.5	28.5	9.097	81.1	5.841	54.2	21.1	0.09
1984	54.8	54.2	10.668	119.7	8.983	52.9	57.8	0.24
1985	54.5	52.9	10.217	117.6	5.071	60.4	52.1	0.22
1986	77.8	60.4	10.113	148.3	8.167	49.6	90.6	0.38
1987	69.2	49.6	16.192	135.0	20.077	50.7	64.2	0.26
1988	82.4	50.7	11.219	144.3	26.196	67.5	50.6	0.21
1989	89.3	67.5	12.509	169.3	24.606	71.6	73.1	0.30
1990	102.1	71.6	15.581	189.3	34.454	73.3	81.5	0.33
1991	98.0	73.3	12.370	183.7	36.013	66.1	81.7	0.32
1992	123.7	66.1	11.535	201.3	16.798	79.6	104.9	0.41
1993	139.1	79.6	12.785	231.4	17.295	91.7	122.4	0.47
1994	110.0	91.7	20.566	222.3	16.005	77.4	128.9	0.49

1/ Total U.S. pack from the American Frozen Food Institute.

2/ December 31, stocks in cold storage from the National Agricultural Statistics Service, USDA.

3/ Trade data from the Bureau of the Census, U.S. Department of Commerce.

Source: Economic Research Service, USDA.

Table 7--Harvested blueberry area, selected States, 1980-94

State	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Acres															
Maine 1/	14,800	17,300	NA	NA	NA	NA	NA	23,600	NA	NA	NA	29,000	30,000	30,000	30,000
Michigan 2/	9,400	9,800	NA	12,000	NA	NA	15,000	NA	NA	16,000	NA	NA	13,000	15,500	15,500
New Jersey	8,100	7,800	7,800	7,800	7,900	7,700	7,900	7,500	7,700	7,800	7,900	8,200	7,600	8,100	7,600
North Carolina	3,000	3,200	3,100	4,000	3,200	3,200	4,000	3,400	3,600	4,350	2,900	2,900	2,800	2,900	3,000
Oregon	550	580	620	700	750	800	900	1,200	1,300	1,370	1,450	1,550	1,800	1,850	1,950
Washington	800	800	900	900	800	800	800	900	1,000	900	850	900	1,200	1,200	1,400
Alabama	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250	90	260
Arkansas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	700	700	700
Florida	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,200	1,000	1,300
Georgia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,500	3,700	3,700
Indiana	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	750	830	830
New York	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	320	280	330
Total	36,650	39,480	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	63,120	66,150	66,570

NA= Not available.

1/ Maine produces wild blueberries, other States cultivated.

2/ Includes small amount from Indiana, prior to 1992.

Sources: New England Agricultural Statistics Service, Oregon Agricultural Statistics Service, Washington Agricultural Statistics Service, and National Agricultural Statistics Service, USDA.

Table 8--Blueberry yield per harvested acre, selected States, 1980-94

State	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Pounds/acre															
Maine	1,430	1,260	NA	NA	NA	NA	NA	1,540	NA	NA	NA	1,355	2,807	2,500	1,933
Michigan	4,360	5,310	NA	4,095	NA	NA	3,800	NA	NA	3,756	NA	NA	2,620	5,610	3,030
New Jersey	3,210	3,590	4,000	2,950	3,800	4,550	3,800	3,030	2,860	3,850	3,040	3,900	3,030	3,890	4,140
North Carolina	1,990	2,230	1,530	1,650	2,940	530	1,760	3,370	3,860	2,940	2,100	3,970	3,790	5,170	5,000
Oregon	5,976	6,513	6,139	7,500	6,000	6,500	6,733	7,692	7,054	8,190	7,900	8,070	8,610	7,840	8,970
Washington	6,380	5,750	6,800	8,000	6,000	6,075	3,625	7,000	6,500	7,000	7,400	5,500	6,800	5,600	6,200
Alabama	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	800	300	1,250
Arkansas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,570	2,860	2,430
Florida	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,750	1,000	2,310
Georgia	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,430	1,490	2,030
Indiana	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,330	3,370	3,250
New York	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,000	3,000	2,120

NA= Not available.

Sources: New England Agricultural Statistics Service, Oregon Agricultural Statistics Service, Washington Agricultural Statistics Service, and National Agricultural Statistics Service, USDA.

Table 9--States reporting blueberry production: Agricultural Census 1987 and 1992

State and county ¹	1992					1987				
	Harvested		Production	Irrigated		Harvested		Production	Irrigated	
	Farms	Area		Farms	Area	Farms	Area		Farms	Area
	Number	Acres	1,000 pounds	Number	Acres	Number	Acres	1,000 pounds	Number	Acres
Alabama	178	432	604	120	347	83	232	438	52	159
Arkansas	168	769	1,405	152	748	127	530	1,256	115	496
Florida	387	1,924	2,734	236	1,713	161	1,172	1,199	115	1,014
Georgia	379	3,082	7,056	145	1,274	256	1,740	2,842	114	927
Indiana	83	814	1,391	39	347	85	708	2,378	36	280
Louisiana	134	316	490	92	251	62	172	198	49	155
Maine ²	97	882	1,564	14	75	110	2,426	2,464	14	132
Washington	21	284	794	(N)	(N)	35	1,796	1,862	1	(N)
Hancock	11	189	352	(N)	(N)	28	342	356	4	(N)
Other	65	409	418	14	75	47	288	246	9	132
Maine (wild)	589	22,234	71,843	22	1,005	433	21,186	31,988	9	334
Washington	254	14,371	56,566	12	(N)	201	13,695	23,106	6	(N)
Hancock	155	3,969	7,364	3	(N)	125	3,870	5,028	1	(N)
Waldo	44	1,253	2,892	(N)	(N)	26	505	477	(N)	(N)
Knox	60	1,229	2,469	2	(N)	33	1,846	1,964	(N)	(N)
Lincoln	20	507	1,265	(N)	(N)	12	434	424	(N)	(N)
Other	56	905	1,286	5	1,005	36	836	988	2	334
Michigan	697	14,928	35,908	314	9,228	711	13,712	48,045	257	5,692
Ottawa	147	4,976	16,370	92	3,392	132	4,464	16,934	73	2,172
Van Buren	213	5,868	10,699	80	3,929	220	4,422	15,460	55	1,696
Allegan	91	1,673	3,353	43	801	112	2,133	7,285	36	865
Berrien	88	973	2,263	23	352	98	1,069	3,472	23	209
Muskegon	27	574	1,617	10	309	38	797	3,020	14	(N)
Kent	8	53	129	6	35	8	(N)	218	5	39
Genesee	6	66	(N)	3	(N)	6	67	234	4	54
Other	117	745	1,477	57	410	97	760	1,422	47	657
Mississippi	232	843	1,451	164	634	73	191	297	44	158

continued--

Table 9--States Reporting Blueberry Production: Agricultural Census, 1987 and 1992, continued

state and county ¹	1992						1987			
	Harvested		Production	Irrigated		Harvested		Production	Irrigated	
	Farms	Area		Farms	Area	Farms	Area		Farms	Area
	Number	Acres	1,000 pounds	Number	Acres	Number	Acres	1,000 pounds	Number	Acres
New Jersey	211	7,349	25,017	97	5,399	251	7,768	24,146	93	4,071
Atlantic	72	4,790	19,401	59	4,294	66	3,979	15,161	45	2,466
Burlington	84	2,186	4,822	17	785	133	2,710	5,263	28	706
Other	55	373	795	21	320	52	1,079	3,722	20	899
New York	218	700	1,241	64	242	157	548	968	38	200
North Carolina	243	3,581	7,286	98	1,050	185	3,032	7,219	91	700
Bladen	24	1,668	3,476	12	606	31	1,659	3,501	9	(N)
Pender	11	942	1,852	1	(N)	9	507	1,142	(N)	(N)
Columbus	9	122	466	2	(N)	4	(N)	(N)	3	(N)
Other	199	849	1,493	83	444	141	866	2,576	79	700
Oregon	489	2,199	14,409	430	1,983	352	1310	7,141	299	1,170
Marion	70	662	4,165	65	574	56	319	1,703	53	248
Washington	78	459	4,064	69	419	56	324	2,937	51	309
Yamhill	25	273	1,948	21	258	21	44	93	12	31
Clackamas	111	291	1,601	94	254	77	173	630	59	152
Lane	53	64	424	47	58	37	62	375	33	58
Benton	11	70	414	10	70	9	79	302	8	78
Columbia	12	58	(N)	10	53	11	105	289	7	95
Other	129	322	1,792	114	297	85	204	813	76	199
Washington	174	1,356	8,760	104	925	146	967	5,827	85	612
Whatcom	33	521	4,363	26	362	26	(N)	2,681	22	(N)
Clark	36	156	1,049	27	135	30	133	818	20	120
Skagit	5	199	839	3	123	6	(N)	(N)	6	71
Thurston	15	133	733	7	88	9	116	674	5	(N)
Pierce	22	60	583	8	14	22	94	501	12	47
Other	63	287	1,193	33	203	53	624	1,153	20	374
United States	5,908	66,239	190,694	2,871	27,646	4,412	59,216	142,038	1,919	17,692
Wild	685	23,055	72,753	32	1,025	501	21,969	32,616	22	420
Cultivated	5,223	43,184	117,941	2,839	26,621	3,911	37,247	109,422	1,897	17,272

(N): Indicates "not available" or "not published" to avoid disclosure of individual operations.

¹ Major counties sorted by 1992 production. Data is for cultivated only, unless specified.

² Cultivated acreage, believed to include some managed wild stands.

Source: Bureau of the Census, U.S. Department of Commerce.

Table 10--Blueberry marketing outlets, by State, 1992

State	Marketing outlet		
	Processed	Fresh	U-Pick
	Percent		
Alabama	15	75	10
Arkansas	10	80	10
Connecticut	3	27	70
Delaware	0	10	90
Florida	30	60	10
Georgia	62	33	5
Idaho	0	25	75
Illinois	0	60	40
Indiana	30	30	40
Iowa	0	0	100
Kansas	0	0	100
Kentucky	0	20	80
Louisiana	40	40	20
Maine	99	1	0
Maryland	0	10	90
Massachusetts	5	65	30
Michigan	60	35	5
Minnesota	5	10	85
Mississippi	60	30	10
Missouri	10	30	60
N. Hampshire	70	30	0
New Jersey	30	65	5
New York	5	50	45
N. Carolina	33	63	4
Ohio	10	35	55
Oklahoma	10	30	60
Oregon	55	40	5
Pennsylvania	0	40	60
S. Carolina	0	10	90
Tennessee	0	20	80
Texas	25	50	25
Vermont	0	25	75
Virginia	0	10	90
Washington	40	50	10
Wisconsin	0	5	95

Source: Moore, James N., from "The Blueberry Industry of North America," Published in Acta Horticulturae 346, 1993.

Table 11--U.S. blueberry shipments, monthly, 1985-94

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	Million pounds												
All ¹													
1985	0.1	0.2	0.1	--	--	7.5	20.7	8.5	9.8	0.5	--	--	47.4
1986	0.7	0.1	0.1	--	--	7.6	20.2	10.0	5.8	1.3	--	0.1	45.9
1987	0.3	0.2	0.1	--	0.2	8.7	19.9	14.0	4.0	--	--	0.2	47.6
1988	0.2	0.1	0.1	--	0.2	9.6	14.0	25.6	3.4	--	--	0.2	53.4
1989	0.2	0.1	--	--	--	6.5	15.4	9.3	12.8	0.8	--	0.2	45.3
1990	0.3	0.1	0.1	0.1	4.5	5.2	17.4	20.1	4.1	--	--	0.1	52.0
1991	0.2	0.1	0.1	--	4.2	11.1	21.2	21.9	1.9	--	--	--	60.7
1992	0.2	0.2	0.1	0.1	1.1	6.8	16.5	20.3	3.5	1.0	0.8	0.2	50.8
1993	0.3	0.1	--	--	1.5	12.2	22.9	25.6	3.2	--	--	0.2	66.0
1994	0.2	0.1	--	--	5.0	10.7	21.9	21.8	3.1	--	--	0.2	63.0
Florida													
1990	--	--	--	0.1	1.0	0.2	--	--	--	--	--	--	1.3
1991	--	--	--	--	0.3	0.2	--	--	--	--	--	--	0.5
1992	--	--	--	0.1	0.6	0.2	--	--	--	--	--	--	0.9
1993	--	--	--	--	0.1	--	--	--	--	--	--	--	0.1
1994	--	--	--	--	0.9	--	--	--	--	--	--	--	0.9
North Carolina													
1985	--	--	--	--	--	0.9	--	--	--	--	--	--	0.9
1986	--	--	--	--	--	3.0	--	--	--	--	--	--	3.0
1987	--	--	--	--	0.2	5.6	--	--	--	--	--	--	5.8
1988	--	--	--	--	0.2	7.5	0.3	--	--	--	--	--	8.0
1989	--	--	--	--	--	4.1	0.2	--	--	--	--	--	4.3
1990	--	--	--	--	3.5	1.4	--	--	--	--	--	--	4.9
1991	--	--	--	--	3.9	3.5	--	--	--	--	--	--	7.4
1992	--	--	--	--	0.5	6.1	0.1	--	--	--	--	--	6.7
1993	--	--	--	--	1.4	8.8	0.8	--	--	--	--	--	11.0
1994	--	--	--	--	4.1	4.6	0.4	--	--	--	--	--	9.1
New Jersey													
1985	--	--	--	--	--	6.4	13.8	1.6	--	--	--	--	21.8
1986	--	--	--	--	--	4.4	14.1	1.7	--	--	--	--	20.2
1987	--	--	--	--	--	2.8	10.9	0.6	--	--	--	--	14.3
1988	--	--	--	--	--	2.1	9.9	1.3	--	--	--	--	13.3
1989	--	--	--	--	--	2.4	10.5	1.8	--	--	--	--	14.7
1990	--	--	--	--	--	3.5	12.0	0.4	--	--	--	--	15.9
1991	--	--	--	--	--	6.6	13.8	0.4	--	--	--	--	20.8
1992	--	--	--	--	--	0.4	10.1	2.5	--	--	--	--	13.0
1993	--	--	--	--	--	3.4	15.2	2.1	--	--	--	--	20.7
1994	--	--	--	--	--	6.1	14.0	1.2	--	--	--	--	21.3
Michigan													
1985	--	--	--	--	--	0.2	6.9	5.6	0.6	--	--	--	13.3
1986	--	--	--	--	--	0.2	6.0	5.7	0.4	--	--	--	12.3
1987	--	--	--	--	--	0.3	7.8	2.5	0.0	--	--	--	10.6
1988	--	--	--	--	--	--	3.4	3.1	0.0	--	--	--	6.5
1989	--	--	--	--	--	--	4.7	7.3	0.6	--	--	--	12.6
1990	--	--	--	--	--	--	5.3	7.1	0.7	--	--	--	13.1
1991	--	--	--	--	--	0.8	7.3	3.2	0.1	--	--	--	11.4
1992	--	--	--	--	--	--	2.2	5.7	1.9	0.1	--	--	9.9
1993	--	--	--	--	--	--	6.0	10.9	1.7	--	--	--	18.6
1994	--	--	--	--	--	--	6.2	6.7	1.0	--	--	--	13.9

--: No shipments reported.

¹Includes imports from Canada, Chile, and New Zealand.

Note: 1994 calculated from preliminary weekly shipments by ERS/USDA.

Source: Agricultural Marketing Service, USDA.

Table 12--Seasonal price indexes for fresh blueberries, 1985-94

Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Percent of season average								
1985	--	--	--	99	94	99	108	--
1986	--	--	--	105	98	97	--	--
1987	--	--	--	100	98	103	--	--
1988	--	--	--	100	96	104	--	--
1989	--	--	--	109	101	84	106	--
1990	--	--	117	119	82	80	101	--
1991	--	--	124	92	76	108	--	--
1992	--	182	109	70	70	67	101	--
1993	--	--	158	82	72	63	125	--
1994	--	185	94	74	60	69	117	--
Expected value	--	184	121	95	85	87	110	--
Standard deviation	--	2	21	15	14	16	9	--
Expected maximum	--	185	142	110	98	103	119	--
Expected minimum	--	182	100	80	71	72	101	--

--: Insufficient marketings to establish price.

Note: Calculated from monthly and weekly f.o.b. prices, unpublished data from the Agricultural Marketing Service, USDA.

Table 13--Blueberry prices: Monthly f. o. b. shipping point, 1985-94

Year and State	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	Dollars per pound ¹							
1985 average	--	--	--	0.88	0.83	0.87	0.95	--
New Jersey	--	--	--	0.84	0.81	--	--	--
Michigan	--	--	--	0.91	0.85	0.87	0.95	--
1986 average	--	--	--	0.98	0.91	0.91	--	--
New Jersey	--	--	--	0.98	0.87	0.83	--	--
Michigan	--	--	--	--	0.95	0.98	--	--
1987 average	--	--	--	0.95	0.93	0.98	--	--
North Carolina	--	--	--	0.95	--	--	--	--
New Jersey	--	--	--	0.95	0.92	--	--	--
Michigan	--	--	--	--	0.95	0.98	--	--
1988 average	--	--	--	1.23	1.18	1.28	--	--
North Carolina	--	--	--	1.18	--	--	--	--
New Jersey	--	--	--	1.27	1.18	--	--	--
Michigan	--	--	--	--	1.19	1.28	--	--
1989 average	--	--	--	1.21	1.12	0.94	1.18	--
North Carolina	--	--	--	1.18	1.23	--	--	--
New Jersey	--	--	--	1.25	1.05	0.89	--	--
Michigan	--	--	--	--	1.08	0.99	1.18	--
1990 average	--	--	1.42	1.44	0.99	0.97	1.22	--
Florida	--	--	1.38	1.32	--	--	--	--
North Carolina	--	--	1.45	1.50	--	--	--	--
New Jersey	--	--	--	1.50	0.97	--	--	--
Michigan	--	--	--	--	1.02	0.97	1.22	--
1991 average	--	--	1.53	1.13	0.93	1.32	--	--
Florida	--	--	1.66	--	--	--	--	--
North Carolina	--	--	1.39	1.09	--	--	--	--
New Jersey	--	--	--	1.17	0.90	--	--	--
Michigan	--	--	--	1.13	0.95	1.32	--	--
1992 average	--	3.17	1.91	1.22	1.22	1.17	1.77	--
Florida	--	3.17	1.85	1.20	--	--	--	--
North Carolina	--	--	1.96	1.19	--	--	--	--
New Jersey	--	--	--	1.28	1.17	1.06	--	--
Michigan	--	--	--	--	1.28	1.27	1.77	--
1993 average	--	--	2.08	1.07	0.94	0.83	1.65	--
Florida	--	--	2.55	--	--	--	--	--
North Carolina	--	--	1.61	1.11	0.93	--	--	--
New Jersey	--	--	--	1.04	0.91	0.80	--	--
Michigan	--	--	--	--	0.99	0.87	1.65	--
1994 average	--	2.83	1.44	1.13	0.91	1.06	1.79	--
Florida	--	2.83	1.51	--	--	--	--	--
North Carolina	--	--	1.38	1.10	0.95	--	--	--
New Jersey	--	--	--	1.16	0.83	0.92	--	--
Michigan	--	--	--	--	0.95	1.20	1.79	--

--: Insufficient marketings to establish price.

¹Price per flat of 12 1-pint cups that weighs approximately 11 pounds.

Source: Agricultural Marketing Service, U.S. Department of Agriculture.

Table 14--Annual average blueberry prices, selected States, 1980-94

State	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Cents per pound															
Maine ¹	38.0	42.3	52.0	37.0	25.0	23.0	30.0	45.0	45.0	50.0	35.0	45.0	43.0	30.0	30.0
Michigan ¹	31.0	44.9	68.0	53.0	36.0	42.0	51.0	53.0	85.0	52.0	43.0	64.0	65.0	30.0	44.0
New Jersey	61.0	65.0	71.2	79.4	62.0	75.6	77.4	81.9	101.4	74.0	82.7	78.2	94.9	79.4	73.7
Fresh	69.0	71.3	76.0	82.0	69.0	80.0	84.4	90.0	110.0	93.2	90.0	04.0	104.0	87.0	86.0
Processed	34.5	47.0	59.0	70.0	35.0	42.0	49.0	52.0	82.0	50.0	52.0	65.0	03.0	55.0	49.0
North Carolina	81.8	76.1	85.4	64.7	88.4	123.8	95.2	80.3	88.8	82.4	109.0	82.0	90.0	89.0	92.5
Fresh	85.1	84.6	98.5	92.0	95.0	125.0	103.0	122.2	111.0	93.5	115.0	103.0	107.0	109.0	105.0
Processed	41.6	37.0	44.0	49.4	30.0	28.0	32.0	37.5	44.0	38.0	25.0	32.0	47.1	34.1	42.6
Oregon	47.0	61.9	68.1	67.6	51.4	55.3	66.7	60.1	75.5	68.7	60.6	64.0	77.5	54.8	51.8
Fresh	67.2	72.0	67.5	74.0	67.0	57.5	NA	NA	NA	NA	NA	NA	108.0	80.5	73.0
Processed	29.3	49.9	69.0	62.0	35.0	52.5	NA	NA	NA	NA	NA	NA	65.0	34.0	34.0
Washington	54.7	60.5	70.0	64.4	49.8	62.9	69.7	68.4	75.9	68.7	59.1	68.1	70.7	50.7	48.2
Fresh	61.6	69.4	72.4	73.1	64.0	79.7	81.5	81.5	83.4	82.0	75.0	92.0	92.0	78.0	62.0
Processed	51.0	53.4	69.1	60.5	42.0	52.6	62.5	60.4	73.0	62.0	55.0	60.0	64.0	39.0	42.0

¹Price for processing blueberries.

Sources: New England Agricultural Statistics Service, Oregon Agricultural Statistics Service, Washington Agricultural Statistics Service, and National Agricultural Statistics Service, USDA.

Table 15--Prices paid to processors for frozen blueberries, Maine and Michigan, monthly, 1985-94

Year and state	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dollars per pound ¹												
1985												
Maine	0.71	0.71	0.71	0.71	0.71	0.71	0.69	0.69	0.59	0.58	0.56	0.56
Michigan	0.67	0.67	0.67	0.67	0.68	0.60	0.68	0.68	0.63	0.58	0.56	0.56
1986												
Maine	0.58	0.58	0.58	0.58	0.60	0.63	0.66	0.67	0.80	0.86	0.92	0.98
Michigan	0.60	0.59	0.63	0.62	0.66	0.69	0.66	0.70	0.78	0.86	0.86	0.89
1987												
Maine	1.06	1.06	1.05	1.10	1.10	--	0.85	0.86	0.86	1.22	1.23	1.22
Michigan	0.93	0.95	0.92	0.92	0.91	--	0.69	0.80	0.87	0.88	0.88	0.08
1988												
Maine	1.23	1.23	1.24	1.24	1.23	--	0.97	0.97	0.97	1.00	0.98	0.99
Michigan	0.94	0.96	0.96	0.98	1.03	--	1.10	1.10	1.09	1.07	1.03	1.00
1989												
Maine	1.00	0.98	1.01	1.01	1.00	1.00	--	1.06	1.07	1.07	1.08	1.08
Michigan	1.00	1.00	0.95	0.95	0.97	0.97	0.86	0.80	0.75	0.75	0.73	0.65
1990												
Maine	1.08	1.08	1.08	1.08	1.10	1.10	1.10	0.97	0.98	0.97	0.97	0.97
Michigan	0.64	0.65	0.63	0.63	0.62	0.63	0.62	0.61	0.65	0.62	0.66	0.67
1991												
Maine	0.98	0.95	0.95	0.95	0.95	0.95	0.95	1.03	1.04	1.05	1.05	1.05
Michigan	0.70	0.73	0.77	0.83	0.86	0.06	0.06	0.83	0.85	0.85	0.85	0.85
1992												
Maine	1.05	1.05	1.05	1.05	1.05	1.05	--	0.94	0.93	0.93	0.93	0.93
Michigan	0.88	0.88	0.88	0.80	0.88	0.99	1.02	1.02	0.95	0.93	0.88	0.88
1993												
Maine	0.91	0.89	0.88	0.88	0.80	0.85	0.85	0.79	0.75	0.73	0.72	0.70
Michigan	0.83	0.86	0.86	0.86	0.82	0.77	0.62	0.57	0.51	0.52	0.52	0.52
1994												
Maine	0.69	0.69	0.69	0.75	0.75	0.75	0.75	--	0.77	0.78	0.80	0.80
Michigan	0.53	0.52	0.51	0.51	0.51	0.51	0.51	0.59	0.58	0.59	0.60	0.60

--: Insufficient marketings to establish price.

¹Processor prices for private label product, per 30-pound container.

Source: The Food Institute Report, various issues.

Table 16--End-of-the-month frozen blueberry stocks, 48-State total, 1980-94

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Million pounds												
1980	34.0	28.9	24.4	21.6	18.5	16.0	16.9	37.8	44.1	38.4	33.0	29.4
1981	25.8	21.8	17.8	14.3	11.2	8.0	12.9	40.9	30.8	32.6	28.7	25.4
1982	22.1	18.3	14.7	NA	NA	5.9	NA	NA	39.6	NA	NA	28.5
1983	27.1	22.0	19.3	16.3	12.4	9.3	15.4	59.9	69.0	62.2	55.8	54.2
1984	51.5	47.5	43.0	41.5	36.9	33.8	30.7	60.4	68.8	59.3	56.5	52.9
1985	44.9	42.0	35.1	29.5	23.8	20.1	23.2	65.0	77.7	76.0	70.0	60.4
1986	55.1	47.9	37.9	32.3	25.8	20.4	27.7	69.5	68.3	64.1	57.1	49.6
1987	44.7	39.1	32.5	27.3	22.0	18.0	34.7	68.7	71.7	67.3	59.5	50.7
1988	44.3	30.0	31.8	26.1	19.7	16.3	25.3	93.9	93.9	86.6	76.4	67.5
1989	61.4	54.1	45.3	38.3	30.9	24.6	30.1	71.4	83.5	82.1	76.2	71.6
1990	64.2	57.8	49.4	42.9	36.8	30.5	30.9	93.6	101.6	90.6	80.2	73.3
1991	64.7	57.1	50.3	42.3	32.7	28.6	42.6	87.2	86.9	83.6	75.5	66.1
1992	60.7	53.8	44.0	37.6	31.9	20.7	38.3	70.5	97.1	91.8	86.3	79.6
1993	69.1	61.0	52.0	45.6	38.6	30.3	34.8	107.6	115.6	105.6	97.9	91.8
1994	80.8	77.5	68.3	56.9	48.7	41.4	51.6	114.0	112.2	93.7	54.8	70.3

NA: Not available.

Source: National Agricultural Statistics Service, USDA.

Table 17--Blueberries: Size distribution of farms, by sales class, 1987

State	All farms	Value of crop sales				
		\$500,000 or more	\$100,000 \$499,999	\$50,000 \$99,999	\$25,000 \$49,999	Less than \$25,000
		Number of farms				
Arkansas	127	0	4	9	11	103
Florida	161	0	8	5	11	137
Georgia	256	1	13	10	17	215
Indiana	85	0	9	7	19	50
Maine	543	4	15	20	52	452
Michigan	711	7	80	80	84	460
New Jersey	251	10	38	19	24	160
New York	157	4	15	9	8	121
North Carolina	185	3	22	20	14	126
Oregon	352	6	23	15	30	278
Washington	146	4	10	12	10	110
Other States	1,370	6	85	73	91	1,115
United States	4,344	45	322	279	371	3,327

Source: Bureau of the Census, U.S. Department of Commerce.

Table 18--Blueberry cultivars, 1992

Type	Cultivar	Share of North America's planted area	Top 10 cultivars	State	Share of State's planted area
		Percent			Percent
Highbush		80.51			
Bluecrop		32.94	Bluecrop	Michigan	30
Jersey		16.17		New Jersey	50
Weymouth		5.32		Oregon	30
Croatan		5.06		Arkansas	70
Blueray		3.95		New York	40
Elliott		3.75		Washington	25
Rubel		2.94		Indiana	23
Berkely		2.24			
Bluetta		1.79	Jersey	Michigan	40
Patriot		1.13		Oregon	7
Earlblue		1.01		New York	5
Duke		0.89		Washington	15
Northland		0.67		Indiana	37
Collins		0.57			
Murphy		0.51	Weymouth	New Jersey	30
Coville		0.45			
New Murphy		0.42	Croatan	North Carolina	60
1613A		0.26			
Bluejay		0.22	Blueray	Michigan	4
Northblue		0.14		Washington	5
Spartan		0.04			
Northcountry		0.03	Elliott	Michigan	7
Darrow		0.01		New Jersey	5
Northsky		0.01			
St. Cloud		0.01	Rubel	Michigan	8
Rabbiteye		18.02			
Tifblue		8.45	Tifblue	North Carolina	5
Climax		4.35		Georgia	44
Brightwell		1.47		Mississippi	66
Premier		1.00		Alabama	60
Woodward		0.84			
Delite		0.50	Climax	Georgia	24
Powderblue		0.49		Florida	20
Aliceblue		0.45		Texas	25
Beckyblue		0.45		Mississippi	10
Homeblue		0.01			
Southern highbush		1.47			
Sharpblue		1.14	Sharpblue	Florida	25
O'Neal		0.34			

Source: James N. Moore, "Blueberry Cultivars of North America," HortTechnology, October/December 1993.

Table 19--Typical blueberry harvest dates, by State

State	Start	Peak	End
Florida	April 15	May 1 to June 10	June 15
North Carolina	May 10	May 25 to July 1	July 10
Arkansas	June 1	June 10 to July 15	July 25
Georgia	June 1	June 8 to July 10	July 18
New Jersey	June 10	July 1 to August 15	August 30
Oregon	July 5	August 5 to September 5	September 10
Washington	July 5	August 5 to September 5	October 5
Michigan	July 10	July 25 to September 10	October 5
Maine	August 1	August 18 to August 25	September 5

Source: Highbush Blueberry Production Guide, Cornell University Cooperative Extension Service.

Figure 1--U.S. blueberry production

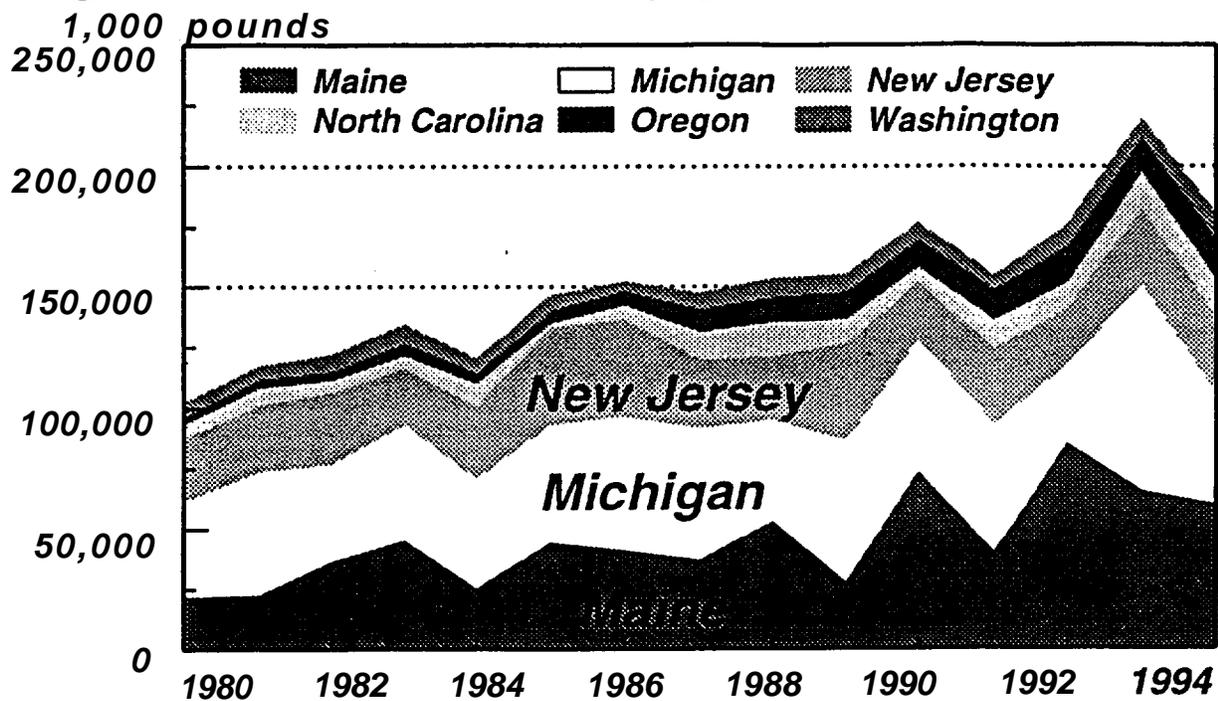


Figure 2--U.S. blueberry utilization

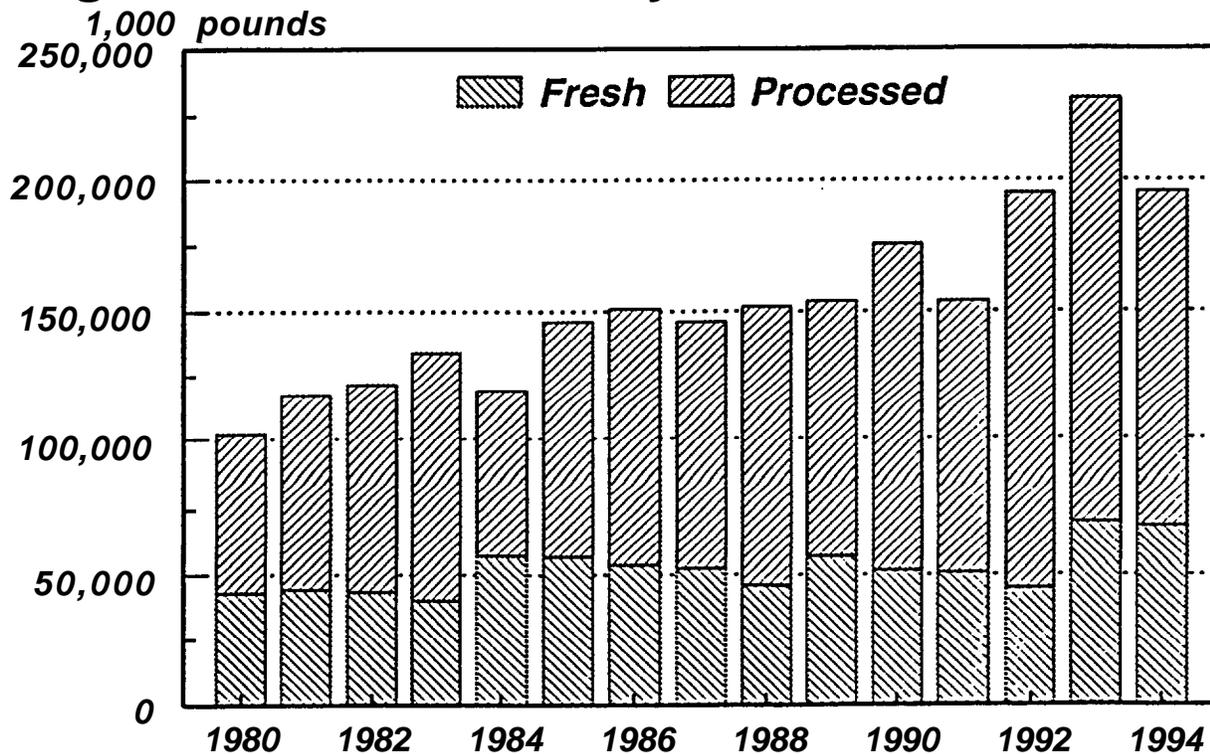


Figure 3--U.S. blueberry consumption

Pounds per person

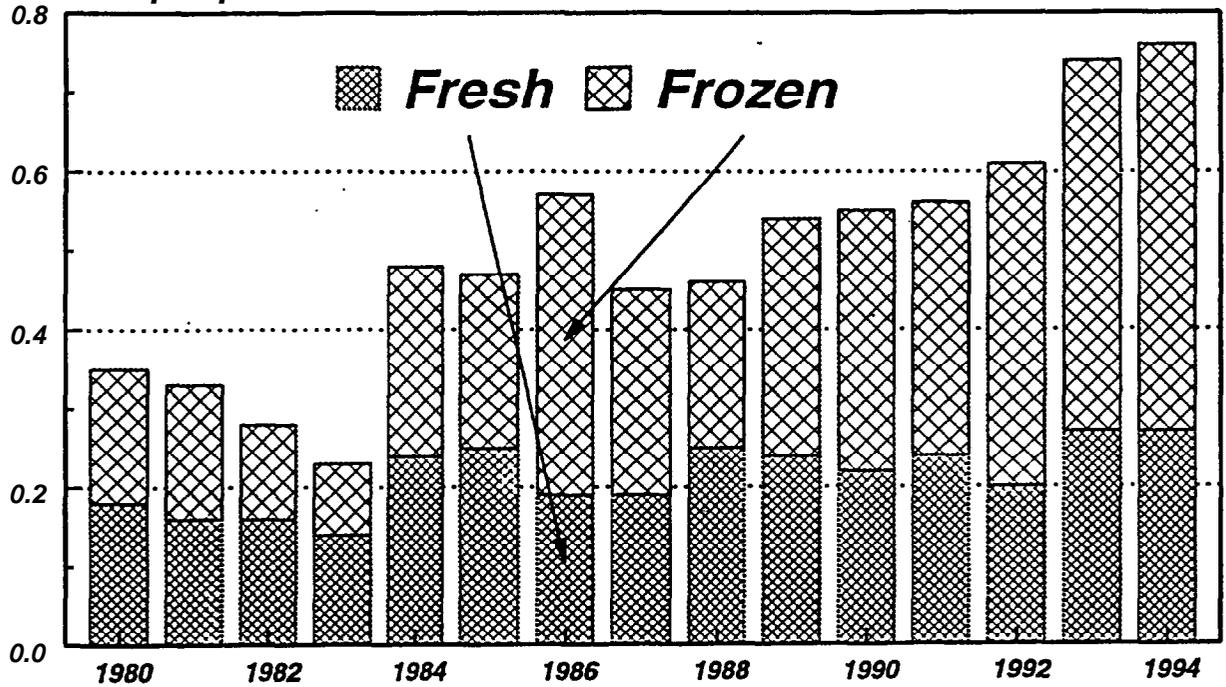


Figure 4--U.S. blueberry grower prices

Dollars per pound

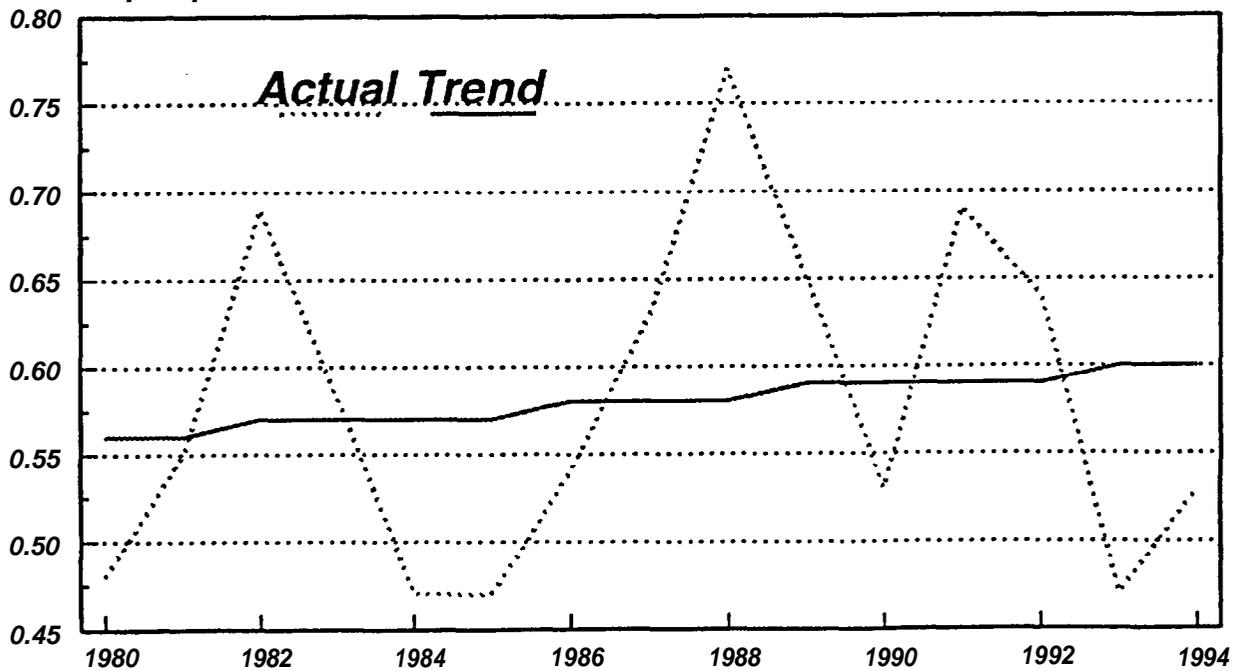


Figure 5--U.S. blueberry shipments

100,000 pounds

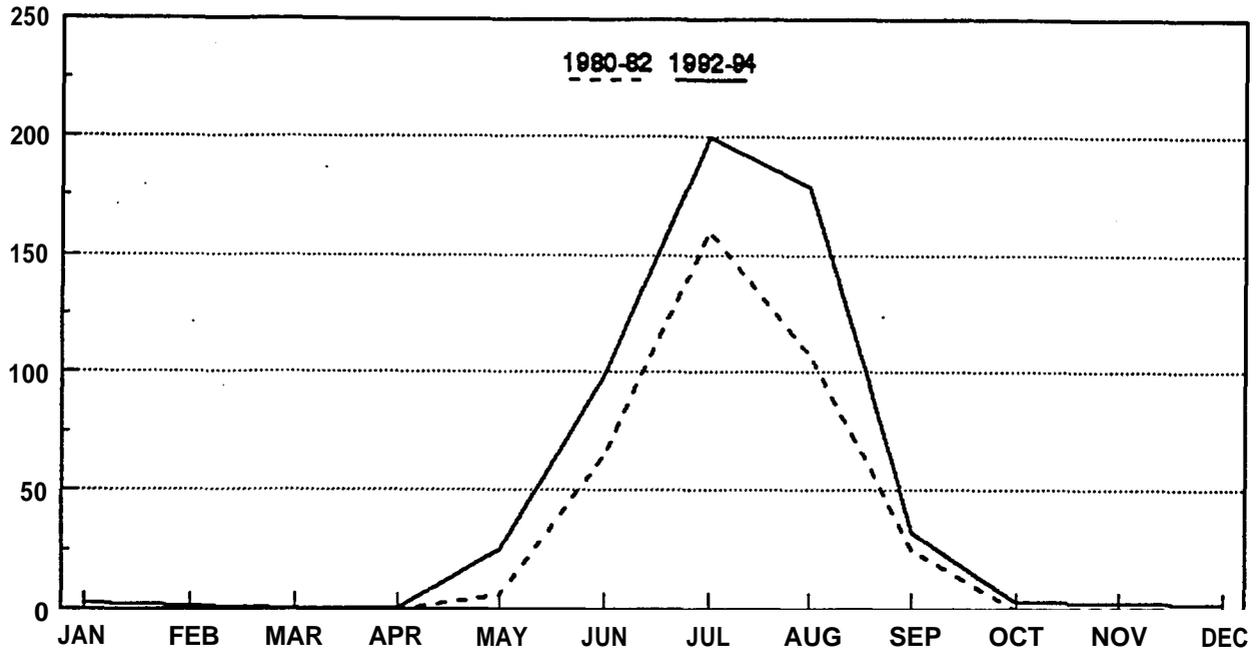


Figure 6--Blueberry price patterns, 1985-94

Percent of annual average

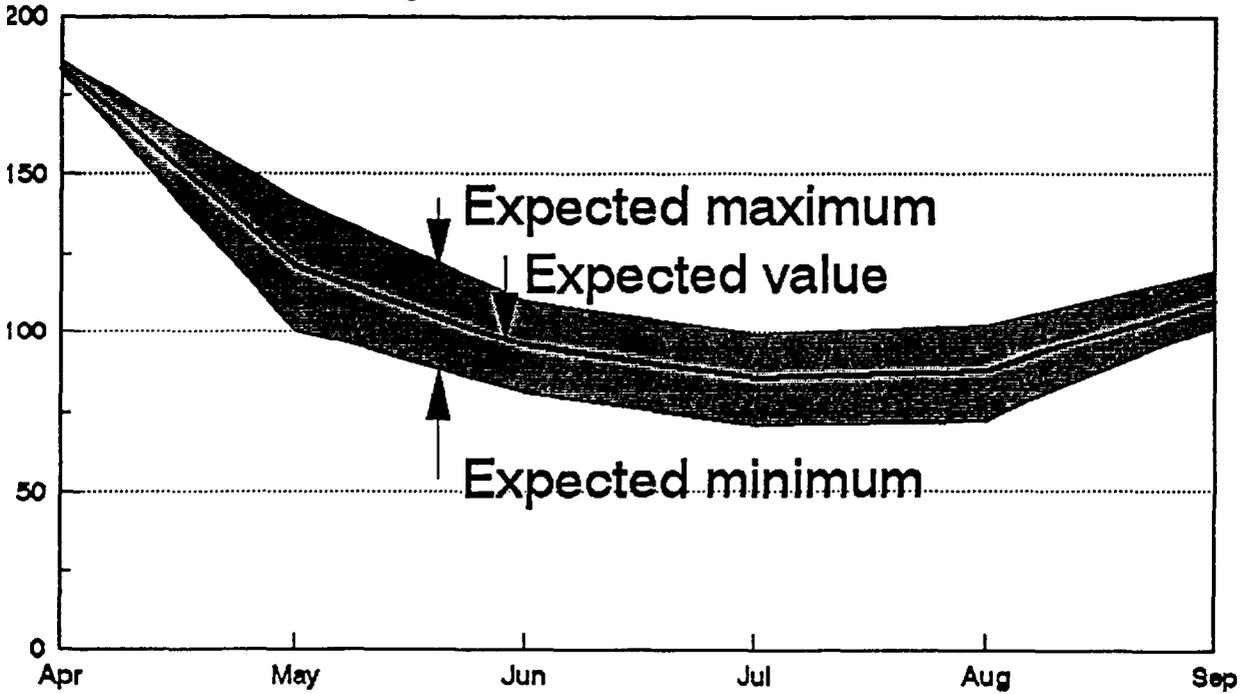


Figure 7--North Carolina blueberry prices

Dollars per pound

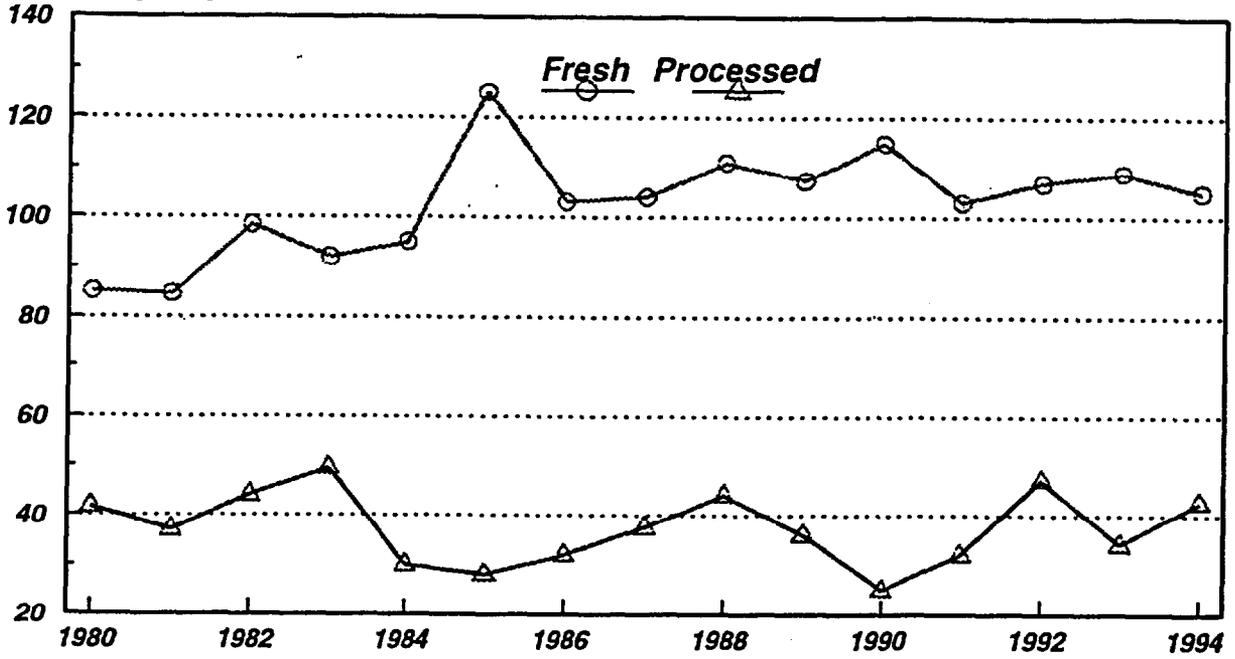


Figure 8--New Jersey blueberry prices

Dollars per pound

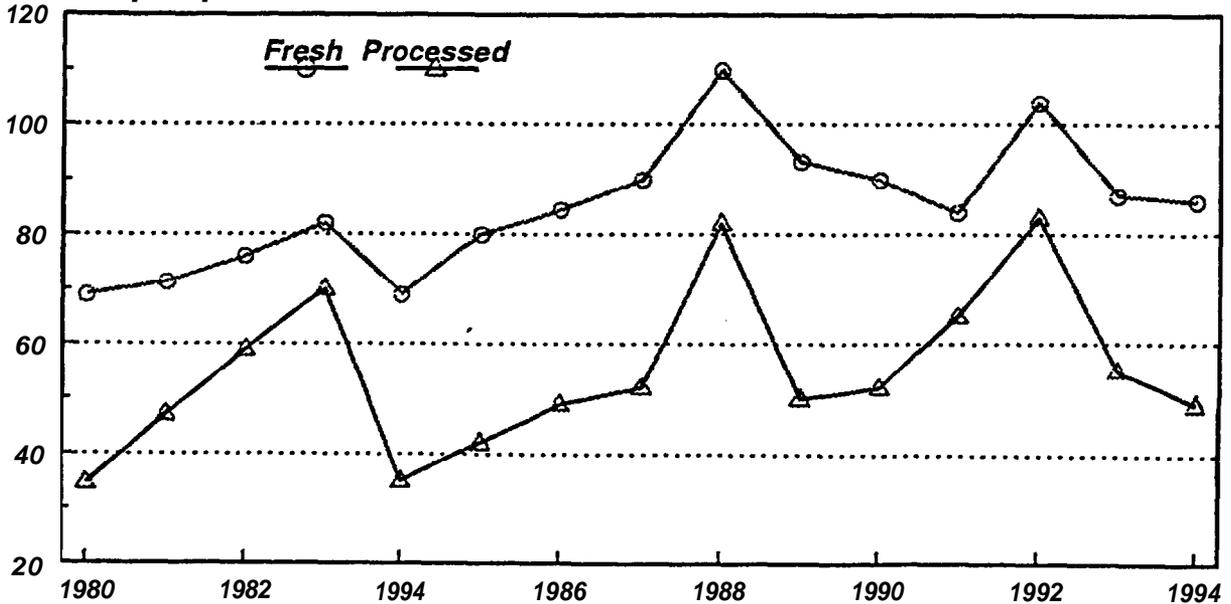


Figure 9--Prices of blueberries for processing

Dollars per pound

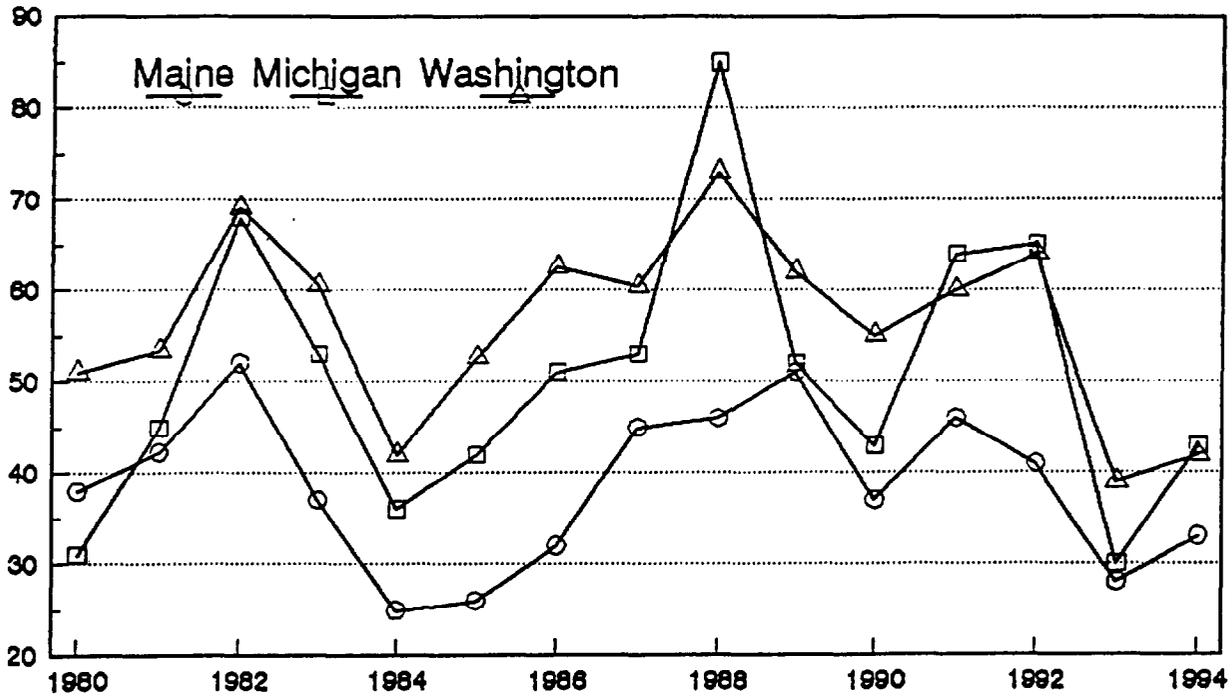


Figure 10--Prices of fresh-market blueberries

Dollars per pound

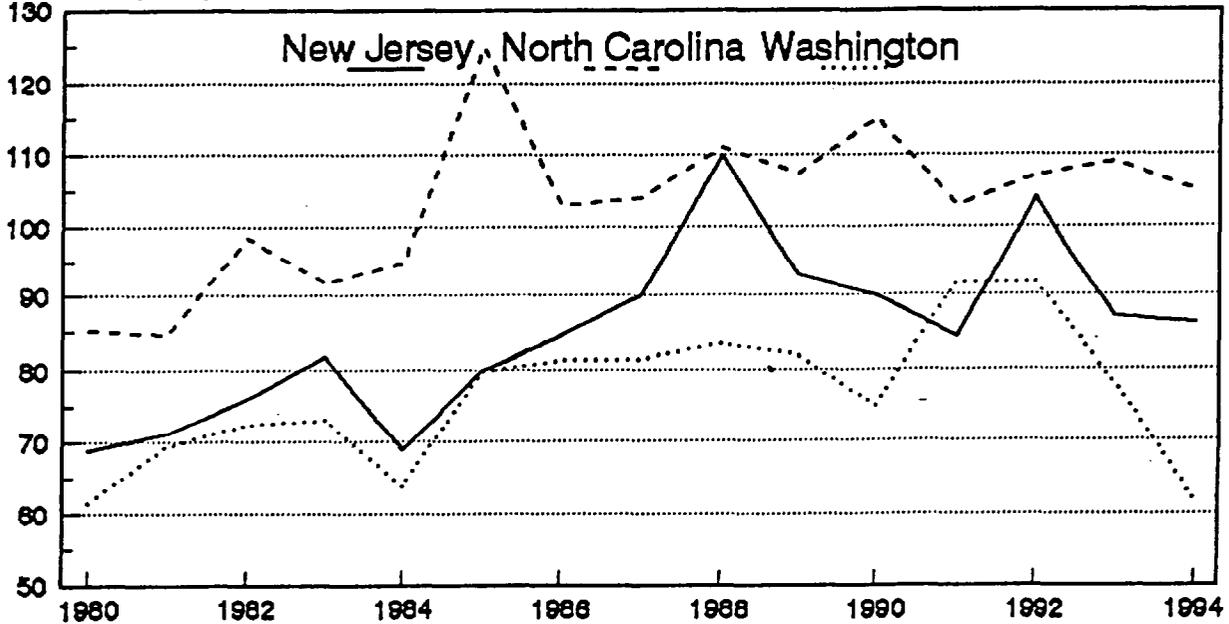


Figure 11--U.S. frozen blueberry stocks

Million pounds

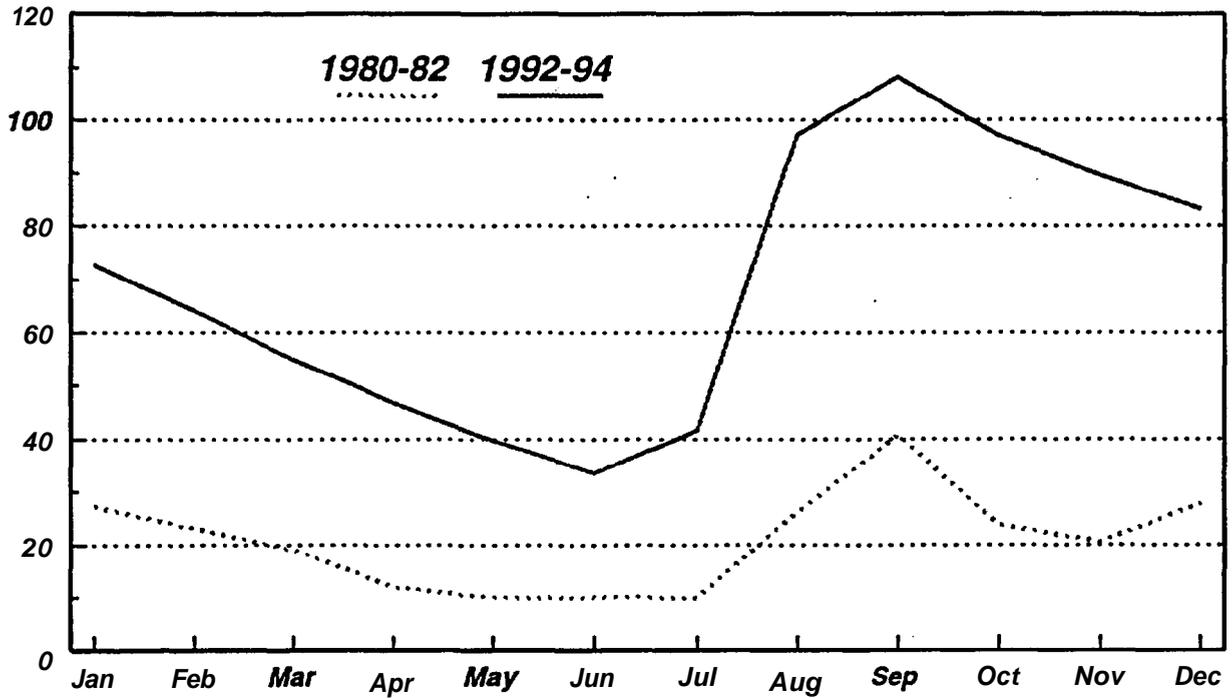


Figure 12--Bulk prices of frozen blueberries

Dollars per pound

